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THE BACTERIA OF GANGRENOUS WOUNDS.*

BY

MAJOR H. R. DEAN, M.D., F.R.C.P., R.A.M.C.(T.),
PROFESSOR OF PATHOLOGY, UNIVERSITY OF MANCHESTER,
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(Report to the Medical Research Committee.)

THE cases which provided the material for this investigation were selected from those undergoing treatment at the 3rd Northern General Hospital, Sheffield. The injuries were of a severe nature, and in nearly all there was evidence of the presence of necrotic or gangrenous tissue in the wound. Comparatively few, however, presented the clinical features of emphysematous gangrene.

Methods Employed.

The material used for examination consisted of fragments of necrotic tissue or of the discharges from the deeper parts of the wound.

The procedure usually adopted was as follows: Films were prepared and stained by various methods. Attention was directed to the cells and to the appearance and numbers of bacteria present in the discharge.

Methods for the Isolation of Aërobic Organisms.

Plate cultures were made on blood agar, and in some cases on MacConkey's medium. The resulting colonies were identified by the usual methods.

Methods for the Isolation and Identification of Anaërobic Organisms.

A tube containing about 5 c.cm. of broth was heavily inoculated with the material to be examined. In some cases a small piece of necrotic tissue was placed bodily into the tube, in others the material present on one or two swabs was thoroughly emulsified in the broth. In place of broth the following medium was employed on several occasions.

"Egg Broth."

The white and yolk of one egg were thoroughly beaten up by vigorous shaking in a stout glass bottle containing a liberal supply of glass beads; 300 c.cm. of distilled water were then added, and the mixture was thoroughly shaken. The bottle containing the mixture was then placed in a water bath which was slowly brought to the boil. This temperature was maintained for half an hour. During the whole period of heating the bottle was constantly and violently shaken. The result was a loose porridge-like mass consisting of finely divided particles of egg suspended in fluid. The medium was distributed in quantities of 50 to 100 c.cm. in wide-mouthed bottles, which were plugged and sterilized in the autoclave.

"Egg broth" prepared in this way proved to be very useful as a culture medium for the growth of anaërobic micro-organisms. It is particularly useful for the growth *B. oedematis maligni*.

This egg broth or ordinary nutrient broth, after liberal inoculation, was heated for half an hour at a temperature of 80° C. It was then incubated in a Bulloch's chamber at 37° C. for periods which varied from two to twenty days. After this preliminary incubation (1) films were prepared, stained, and examined; (2) guinea-pigs were inoculated subcutaneously with one or two cubic centimetres of the broth; (3) agar, blood agar, or glucose agar plates were prepared, inoculated from the broth, placed in a Bulloch's chamber, and incubated for a period of three to seven days.

It was found that glucose agar was the most suitable medium for these anaërobic plate cultures. Subcultures from the resulting colonies were made on Dorset's egg medium, which proved admirably adapted for the needs of *B. aërogenes capsulatus* and *B. oedematis maligni*. It is probably better to subculture tetanus on glucose agar. The cultural characteristics of the various strains of anaërobic bacteria were examined on various culture media.

* A more detailed account of this investigation is to be published in the *Journal of the Royal Army Medical Corps*.

General Table.

No. of Case.	Gas observed in Tissues.	Symptoms of Tetanus.	Fatal.	B. oedematis maligni.	B. aerogenes capsulatus.	B. tetani.
1	0	+	0	+	+	0
2	+	0	+	+	+	0
3	0	0	0	+	+	0
4	0	0	0	0	0	0
5	0	0	0	+	0	0
6	0	+	0	+	0	+
7	0	0	0	+	0	0
8	0	0	0	+	+	0
9	0	0	0	+	+	0
10	0	0	0	+	+	+
11	0	0	0	+	+	0
12	0	0	0	+	+	0
13	0	0	0	0	+	0
14	+	0	0	+	+	+
15	0	+	0	+	+	0
16	0	+	+	0	+	+
17	+	0	+	+	0	0
18	+	0	0	+	+	0

Comment on Results.

The eighteen cases enumerated in Table I came under observation during a period of ten months from September, 1914, to June, 1915. The patients had been wounded in various parts of France and Belgium during this period. Although the number of cases is small, the series comprises patients wounded in widely separated districts and under very different climatic conditions, and in the circumstances the absence of variety in the bacteriological findings is somewhat noteworthy. The cases investigated were those in which there had been gross destruction of tissue, with subsequent necrosis and gangrene. The discharge from the wound was, in the majority of cases, excessively offensive.

The aërobic bacteria which were isolated call for little comment. Streptococci were isolated from nearly every case. No attempt was made to define accurately the variety of streptococcus, but nearly all those isolated appeared to belong to one type, which in films appeared as a small diplococcus, or more rarely as a chain of four or six members. It grew freely on blood-smeared agar and on ordinary agar in small translucent colonies. Films made from blood agar cultures showed short chains. Staphylococci were isolated less frequently than might have been anticipated. When present, they were not as a rule numerous.

B. coli was only isolated from four cases. The only other aërobic organism of any interest was a *proteus* bacillus from case No. 5.

The Anaërobic Bacteria.

Only three varieties of anaërobic bacteria were isolated—the *B. aërogenes capsulatus*, *B. oedematis maligni*, and the *B. tetani*.

These varieties belong to one group of bacteria, whose normal habitat is usually stated to be highly cultivated earth and dung; their constant presence in wounds of the type investigated was to be anticipated.

Morphology and Staining Reactions.

B. aërogenes capsulatus and *B. oedematis maligni* differ enormously both in shape and in staining reactions under different cultural conditions, and the identification of either from the appearances seen in a film preparation alone may often be difficult. The results obtained by Gram's method of staining differ greatly with the nature of the culture medium and the age of the culture. The influence of the variety of culture medium employed on the formation of spores is also well marked.

The relative rate of growth of the different varieties is a matter of some interest from the practical standpoint, and

is a factor which must be allowed for in any attempt to isolate bacteria of this group in pure culture. In a mixed culture made by inoculating a tube of broth with the discharge obtained from a wound the different varieties appear after different periods of time, as it were in crops. After two or three days' incubation the broth may appear to contain a pure culture of *B. aërogenes capsulatus*. After a further period of incubation the *B. oedematis maligni* is often the predominant organism. Tetanus bacilli seem to require a still longer interval for multiplication, and may appear first after ten days' incubation. A result of this kind was obtained on several occasions, and in the later cases of the series the original broth culture was subjected to a routine examination at various intervals after inoculation. The preparation of pure cultures was thereby considerably facilitated. It is possible that a similar method might prove useful in dealing with other groups of bacteria.

The cultural characteristics of the various strains were examined on a variety of media. The appearances of well isolated colonies on agar and glucose agar plates, the characteristics of the growth on agar, glucose agar, broth, litmus milk and Dorset's egg medium, and the reactions produced with various sugars and alcohols were recorded.

The Bacillus of Malignant Oedema.

A pure culture of this bacillus was isolated in fifteen of the eighteen cases. All were cases in which considerable laceration and necrosis of tissue had occurred, and all were characterized by an offensive discharge. The degree and extent of the septic process varied considerably in the various cases of the series. Gas formation in the tissues was observed in four cases only, in three of which *B. aërogenes capsulatus* was also found. Of the fifteen cases three only were fatal—Cases 2, 16, and 17. In Case 2 there was a large gas containing abscess of the arm, *B. aërogenes capsulatus* and *B. coli* were also present. Case 16 was one of tetanus. Case 17 was remarkable in that it was the only case of the series in which, although there was abundant gas formation in the tissues, *B. aërogenes capsulatus* was not found. Twelve cases of those in which *B. oedematis maligni* was found made good recoveries. There is apparently no reason to think that the presence of this micro-organism in a wound is necessarily of serious import. This conclusion is substantiated by the results obtained by the inoculation of animals. Its presence is an indication of the occurrence of gangrene, for it has probably little or no capacity for multiplication in living tissue. There appears to be no evidence that its presence is constantly associated with any particular group of signs or symptoms. Many of the films prepared from pus showed that this bacillus is readily taken up by the polymorphonuclear leucocytes.

Isolation of Pure Cultures.

The bacillus of malignant oedema grows extremely well on egg media. When but few are present in the discharge pure cultures are most readily obtained by freely inoculating the egg broth described in an earlier part of this paper and incubating in an anaërobic chamber for five to seven days. The *B. oedematis maligni* may then often be found in very large numbers and pure cultures may readily be obtained by plating on glucose agar.

Cultural Characteristics.

The appearances of a slope culture on Dorset's egg medium are very characteristic. A profuse creamy white growth appears within twenty-four hours. It increases rapidly and is at first raised above the surface of the medium. At the end of forty-eight hours, or even earlier, liquefaction is noticed. A clear fluid gradually accumulates in the lower part of the tube, in which float drops of oil. Liquefaction continues rapidly, and a bluish-black discoloration is a well-marked characteristic of *B. oedematis maligni* in this medium. The odour is extremely powerful and offensive; it is somewhat suggestive of gorgonzola cheese.

Films made from such a culture after incubation at 37° C. under anaërobic conditions for three days showed the following characteristics: The bacilli varied greatly in length; the larger forms, which were the more numerous, were from 8 to 10 μ long and 0.6 μ wide. Of the shorter forms several were observed which measured about 2 μ in length and 0.6 μ in width. The majority of the bacilli occurred singly, but chains of two, four, and six members were met with. They were Gram-positive. Many of the bacilli contained spores which were of an oval shape and situated near to one end of the bacillus. Occasionally one bacillus appeared to contain two spores. A contained spore of average size measured 1.5 μ by 1 μ. There were also a comparatively small number of free spores approximately 2 μ long by 1 μ wide. Films made from an egg culture after seven days' incubation showed numerous large, free oval spores, but very few bacillary forms. The bacilli present in these old egg cultures were Gram-negative.

Surface colonies on glucose agar plates showed a central opaque node from which radiated numerous long delicate hair-like processes. Streak cultures on glucose agar slopes showed a central opaque whitish line, with delicate hair-like lateral projections. Stab cultures in deep glucose agar tubes are not characteristic. Gas formation is well marked, but usually less than in cultures of *B. aërogenes capsulatus*. Profuse growth occurs along the deeper portions of the needle track. The lateral projections are seldom slender spikes, but more often in the form of disc or coin-shaped, circular, flattened projections. Very similar appearances are seen in stab cultures of *B. aërogenes capsulatus*.

Microscopical Appearances of Films made from a Glucose Agar Slope after Three Days' Incubation at 37° C., under Anaërobic Conditions.

The majority of the bacilli were Gram-negative. Variation in size was even more marked than in the case of the egg culture. The following dimensions, which are fairly representative, may be given:

Length	...	15 μ	Breadth	...	0.6 μ
,,	...	8 μ	,,	...	0.8 μ
,,	...	3 μ	,,	...	1.5 μ

Some of the shorter forms resembled oval cocci in outline. The majority were short single rods with rounded ends. There were also long chains of slender bacilli constituting delicate filaments, in which the subdivisions could be distinguished with difficulty or not at all. Spores were not found. After eight days' growth on glucose agar the appearances were not greatly different. All bacilli were Gram-negative and stained poorly. There were great variations in length. A few spores were seen.

The appearances of surface colonies on agar plates, slope cultures, and in deep stabs are similar to those observed with glucose agar. The growth is less profuse. The microscopical appearances of films from an agar slope after three days' incubation were similar to those seen in films made from the glucose agar culture of the same age. Spores, however, were fairly numerous. After eight days' growth on agar the films showed numerous short forms containing spores and a large number of free spores. The bacteria stained badly, and were Gram-negative.

On broth rapid growth occurred with the production of turbidity and an offensive odour. After about a week a deposit formed at the bottom of the tube. In broth cultures filamentous forms or chains were frequent, and attained a considerable length. Spore formations occurred readily, and the older cultures contained more spores than bacillary forms. In young broth cultures the majority of forms were Gram-positive, in older cultures Gram-negative.

After incubation in litmus milk for about seven days under anaërobic conditions very characteristic changes may be observed. When the anaërobic chamber is first opened the contents of the tube are seen in two layers. The upper layer is turbid but translucent, the lower layer consists of a bulky dirty white deposit. The odour is sour and offensive. If the culture is allowed to stand on the bench for twenty-four hours, colour returns to the upper layer. There are now three well defined layers. The uppermost layer has a reddish claret colour except at the actual air surface, where a poorly marked blue ring may often be seen. The middle layer is a colourless translucent, but slightly turbid, fluid. At the bottom of the tube is a bulky deposit. On shaking the tube the whole of the contents assume a claret colour. The fluid is amphoteric to litmus paper.

On inspissated serum a whitish growth appears, and the medium is slowly liquefied with the formation of a neutral or faintly alkaline fluid. There is no discoloration, but the odour of the culture is offensive.

B. oedematis maligni ferments glucose and maltose with the formation of acid and gas. Its action on these sugars is less rapid and less violent than that of *B. aërogenes capsulatus*. Some strains act very slowly, others show a well-marked acid reaction within forty-eight hours. Cane sugar, lactose, mannite, and dulcite remain unaltered. After seven days' incubation under anaërobic conditions the appearance of a tube of serum water glucose or maltose is as follows: At the bottom of the tube is a considerable deposit consisting of flocculi and shreds of torn-up clot. The supernatant fluid is colourless and slightly turbid. At the surface a few shreds of clot of a bright red colour may be seen floating. On shaking, the entire contents of the tube assume a red colour. The culture has an odour suggestive of lactic acid. In the case of some of the strains of malignant oedema, the reaction of the glucose and maltose cultures after incubation was only slightly acid, and no clot was formed. In the majority of cases the sugar reactions were recorded shortly after the isolation of the pure culture, and the tests were repeated after the strains had been subcultured for several months. The strain isolated from Case 3 gave the same reactions in June as it had done shortly after isolation in the previous December.

B. Aërogenes Capsulatus.

This bacillus was isolated from 13 of the 18 cases. In all but one (No. 13) the bacillus of malignant oedema was also found. It was present in 3 of the 4 cases in which the presence of tetanus bacilli was demonstrated. It was present in 3 of the 4 cases in which signs of tetanus developed in the patient. It was present in 3 of the 4 cases in which gas was present in the tissues. Of the 13 cases only 2 were fatal, and in one of these death was due to tetanus.

Isolation.

This bacillus grows readily in broth and egg broth under anaërobic conditions. If the mixed culture which is prepared from the discharge be examined after forty-eight hours, large numbers of this bacillus are often found, and a pure culture may readily be obtained by plating on glucose agar.

Morphological and Cultural Characteristics.

In films made from the fluid present in the subcutaneous tissues of a guinea-pig which has succumbed to experimental inoculation, numerous short Gram-positive rods are seen. The majority occur singly, and have square ends. The organism also occurs in pairs and chains of four. A capsule can be demonstrated. Many of the bacilli are seen within leucocytes. In some of the films made from the pus obtained from gangrenous wounds similar short definitely Gram-positive bacilli occurred. There were, however, other forms, somewhat larger, which stained unevenly by Gram's method. These bacilli exhibited a peculiar arrangement of Gram-positive stripes or granules on a Gram-negative ground. Both these and the Gram-positive forms were encapsulated.

B. aërogenes capsulatus grows excellently on Dorset's egg medium, although not so vigorously as does the bacillus of malignant oedema. The colonies are white, circular, and at first raised above the surface. After three or four days the medium is slowly eroded, and the colonies come to lie at the bottom of shallow saucer-like depressions. The digestion of the medium proceeds slowly, but nothing like the rapid liquefaction produced by *B. oedematis maligni* is seen. No discoloration of the medium occurs. Films prepared from a 48 hours' slope culture on Dorset's egg medium showed single short Gram-positive rods of fairly uniform length. There were a few long and comparatively slender forms and a few very short forms which resembled cocci. Spore formation occurs on this medium. The spores, which are oval in shape, distend the central portion of the bacillus, the remaining cytoplasm of the bacillus appearing as two caps, one at either end of the bacillus. Films prepared from old egg cultures showed great varieties in shape, size, and reaction to Gram's stain. Spores were numerous. On films made from egg medium long slender bacilli with a round terminal spore are occasionally met with. These forms closely resemble the tetanus bacillus.

Isolated colonies on the surface of agar and glucose agar medium appear to the naked eye as circular colonies, 1 to 4 mm. in diameter, somewhat opaque, whitish in colour, and definitely thicker in the centre. Viewed under a × 10 lens, the centre of the colony is seen to be opaque and raised up above a thin semitranslucent marginal zone, which often shows several rings. The margin is slightly wavy, and occasionally the irregularities of the outline are so well marked that an appearance of short offsets or processes is produced. Streak cultures on the surface of a glucose agar slope show a central opaque white line and a marginal somewhat translucent zone, which has a wavy outline. In glucose agar stabs the evolution of gas is commonly so violent that the wool plug and the greater part of the culture medium are expelled from the tube. Under less violent conditions the growth appears as an opaque white streak along the track of the needle, from which proceed flat coin-like outgrowths. The appearances of surface colonies on agar are similar to those on glucose agar, except that the growth is less vigorous. Films prepared from agar and glucose agar cultures of the same age show very marked differences. In films made from a 48 hours' agar culture short forms predominate. Many of the bacilli are very short, very broad, and present an almost square outline. Clostridial forms occur. The margins of many of the bacilli are indistinct and blurred. The bacilli occur singly. Both Gram-positive and Gram-negative forms may be found, but many show well-marked Gram-positive markings on a Gram-negative ground. Films prepared from a 48 hours' glucose agar culture showed considerable varieties in the length of individual bacilli, but long forms predominated. There were numerous pairs and short chains, and a few long chains of six, eight, or more bacilli. In older glucose agar cultures numerous club-shaped forms occurred. In neither agar nor glucose agar cultures were spores found.

Broth cultures are in no way characteristic. Uniform turbidity is seen in young cultures. Older cultures show a deposit and a comparatively translucent supernatant fluid. Films prepared from broth cultures showed numerous short broad rods. The majority occurred singly, but pairs and short chains were not uncommon.

On *inspissated serum* a greyish-white, not very profuse, growth makes its appearance. The surface of the medium is very slowly eroded. Films show forms similar to those seen in films prepared from egg medium. Spore formation occurs on this medium. Forms resembling the tetanus bacillus are occasionally met with.

The appearances of a litmus milk culture are well known. The production of acid and the formation of a clot are accompanied by a violent evolution of gas. After three or four days the tube is found to contain a clear acid translucent fluid and fragments of gas-contorted clot.

Sugar Reactions.—Violent fermentation occurs in media containing glucose and maltose with production of acid and much gas. Cane sugar and lactose are much less readily attacked, and the reaction in media containing these sugars is less acid. No reaction takes place with mannite, dulcite, and inulin. The reactions can be demonstrated by the use of the ordinary peptone-sugar media or by Hiss's serum water sugar media. In the latter media the production of acid is accompanied by the formation of a clot, the disruption of which affords satisfactory evidence of the evolution of gas. The torn and lacerated clot, and the clear, strongly acid fluid which are found in the serum maltose tubes and serum glucose tubes present very characteristic appearances. The sugar reactions of *B. aërogenes capsulatus* were found to be quite constant, and were the same in all the strains examined.

Inoculation Experiments.

The results obtained by the inoculation of the mixed growth contained in the original broth cultures yielded very variable results.

Inoculation experiments were undertaken with eight strains of *B. oedematis maligni* and with five strains of *B. aërogenes capsulatus* in pure culture. In the first series of experiments the inoculated material consisted of either a broth culture, or an emulsion in broth of several loopfuls of the surface growth from a Dorset's egg or agar slope. The injections were subcutaneous. Thirteen

guinea-pigs and two rabbits were inoculated with cultures of *B. oedematis maligni*. One of these animals died twenty-four hours after inoculation. The cause of death, which could not be ascertained, was probably not the inoculation, for the site of the injection showed only a slight inflammatory reaction. The remainder of the animals survived and remained in good health for one month after the inoculation. In a few cases there were signs of illness during the first forty-eight hours, and examination revealed a slight swelling at the site of inoculation. Recovery was in these cases rapid and apparently complete. In the first series of experiments with *B. aërogenes capsulatus* twelve guinea-pigs and two rabbits were used.

Two guinea-pigs which had been inoculated subcutaneously at 5 p.m. on November 25th with 2 c.cm. of a broth culture of *B. aërogenes capsulatus* from Case 2, were found dead at 9 a.m. on November 26th. Emphysema was found at site of inoculation and the skin had been separated from the deep tissues over the greater part of the trunk. The subcutaneous tissues were infiltrated by a blood-stained fluid, in which floated globules of fat. Gas was present in the subcutaneous tissues, but not in the organs of the thorax and abdomen. Films made from the site of inoculation contained large numbers of *B. aërogenes capsulatus*, and a pure culture of this bacillus was obtained from the exudate. The heart blood was sterile.

On December 11th a guinea-pig received a subcutaneous injection of 1 c.cm. of a broth culture of the same strain (Case 2). The animal was found dead on December 15th. Necrosis of tissue was found at the site of the injection, and films showed *B. aërogenes capsulatus* and numerous streptococci. All the organs of the body and the serous membranes were engorged with blood. The lungs showed patchy consolidation. Films made from the lung showed streptococci only. The heart blood was sterile.

On December 11th a guinea-pig received a subcutaneous injection of 1 c.cm. of a broth culture of *B. aërogenes capsulatus* (Case 3). Slight local swelling and gas formation followed. The animal had apparently completely recovered after forty-eight hours. It died on December 18th. At the *post-mortem* examination an acute volvulus of the small intestine was found.

In two additional experiments with pure cultures from strain No. 2 the animals remained in perfect health for two months. Similar experiments were performed with pure cultures from Cases 10, 12, 13, and 14. In each case two guinea-pigs were inoculated. One of the animals inoculated with Strain 13 died after twenty-four hours from typical gas gangrene. The remaining seven animals were kept under observation for more than a month and showed no evidence of infection.

Two rabbits received a subcutaneous injection of 2 c.cm. of a pure culture of Strain 2. After twenty-four hours there was a slight local swelling and the animals appeared to be slightly unwell. Recovery had taken place at the end of forty-eight hours and no further symptoms were observed.

The conclusion arrived at from these experiments was that the subcutaneous injection of pure cultures of *B. aërogenes capsulatus* may occasionally give rise to fatal gas gangrene. With possibly one exception, all the experiments with pure cultures of *B. oedematis maligni* yielded negative results.

The results obtained by animal inoculation with pure cultures accord well with the evidence afforded by the clinical findings in the various cases above recorded. Both *B. oedematis maligni* and *B. aërogenes capsulatus* were present in the majority of the cases; but three only of the eighteen patients died, and in four cases only was gas formation observed in the tissues. We must assume that neither of these micro-organisms is truly parasitic—that is to say, neither bacillus is capable of multiplication in living tissue. In blood clot, in dead tissue, and fragments of foreign bodies which are so often present in wounds, they are capable of active growth and multiplication. Here they produce, by ferment action, poisonous substances, possibly organic acids,* which, in circumstances favourable to them, diffuse out into the surrounding living tissue. The result is that the adjacent tissues die and are then invaded by the micro-organisms. In this fashion the gangrenous area increases in size, successive zones of tissue being first poisoned and then invaded by the saprophytes.

Acting on the assumption that the pathogenic action of these micro-organisms might be dependent on the action of the organic acids which they produce, the following experiments were undertaken:

B. oedematis maligni (Strain 3) and *B. aërogenes capsulatus* (Strain 2) were subcultured on agar, broth, Dorset's egg medium, and on serum water, cane sugar, glucose, lactose, maltose, mannite, and dulcite. With *B. aërogenes capsulatus* marked acid reactions were obtained with glucose and maltose, and less marked reactions with cane sugar and lactose. With *B. oedematis maligni* the media containing glucose and maltose became slightly acid. A portion of each medium was injected into a guinea-pig. In the case of the fluid media the quantity inoculated was 2 c.cm.; in the case of the solid media one loopful of the growth was emulsified in 2 c.cm. of broth. It was thought that the cultures which contained acid might prove the more pathogenic. The result of the experiment was negative. In no case was gangrene produced, and, with the exception of slight and transient symptoms, all the animals remained in perfect health. In a third series of experiments guinea-pigs were inoculated with various strains of *B. oedematis maligni* and *B. aërogenes capsulatus* mixed with a recently isolated strain of *Staphylococcus aureus*. It was thought that the anaërobic bacteria might gain a hold in the tissue damaged by the action of *Staphylococcus aureus*.

Inoculation Experiments.

Series 3.

Experiment 1.—*B. oedematis maligni*, Strain 8, alone. Inoculated on May 27th. No symptoms. Animal alive and well on July 1st.

Experiment 2.—*B. oedematis maligni*, Strain 8, + *Staphylococcus aureus*. Inoculated on May 27th. No symptoms. Animal alive and well on July 1st.

Experiment 3.—Same as Experiment 1.

Experiment 4.—*B. oedematis maligni*, Strain 8, + *Staphylococcus aureus*. Inoculated on May 27th. Animal ill, with local swelling, on May 29th. Died on June 2nd; gangrene of subcutaneous tissues, blood-stained rancid effusion. Films showed pus cells, cocci, and *B. oedematis maligni*.

Experiment 5.—Same as Experiment 1.

Experiment 6.—*B. oedematis maligni*, Strain 8, + *Staphylococcus aureus*. Inoculated on May 27th. No local symptoms. Died on June 14th. No lesion at site of inoculation. No obvious cause of death.

Experiment 7.—*B. oedematis maligni*, Strain 2, alone. Inoculated on May 27th. Died on June 12th. No local lesion; no obvious cause of death.

Experiment 8.—*B. oedematis maligni*, Strain 2, + *Staphylococcus aureus*. Inoculated on May 27th. Died the following day. Swelling and oedema at site of inoculation. Film showed numerous cocci and *B. oedematis maligni*.

Experiment 9.—*B. oedematis maligni*, Strain 15, alone. Inoculated on May 27th. No symptoms. Alive and well on July 1st.

Experiment 10.—*B. oedematis maligni*, Strain 15, + *Staphylococcus aureus*. Inoculated on May 27th. Died on June 21st. No local lesion; no obvious cause of death.

Experiment 11.—Same as Experiment 9.

Experiment 12.—*B. oedematis maligni*, Strain 15, + *Staphylococcus aureus*. Inoculated on May 27th. On May 29th there was local swelling, which was marked on the following day; animal very ill. On the 31st it was much better. It eventually recovered, and was quite well on July 1st.

Experiment 13.—*B. aërogenes capsulatus*, Strain 2, alone. Inoculated on May 27th. On the 28th there was local swelling, and the animal was ill. On the 29th the swelling had disappeared, and the animal was well. It recovered completely, and was alive and well on July 1st.

Experiment 14.—*B. aërogenes capsulatus*, Strain 2, + *Staphylococcus aureus*. Inoculated on May 27th. On May 29th there was local swelling; animal slightly unwell. It recovered completely, and was alive and well on July 1st.

Experiment 15.—*B. aërogenes capsulatus*, Strain 3, alone. Inoculated on May 27th. Died on June 18th. No local lesion; no obvious cause of death.

Experiment 16.—*B. aërogenes capsulatus*, Strain 3, + *Staphylococcus aureus*. Inoculated on May 27th. No symptoms. Animal alive and well on July 1st.

Experiments 17 and 18.—Controls: *Staphylococcus aureus*, alone. Inoculated on May 27th. No symptoms. Animals alive and well on July 1st.

The results obtained in the above series of inoculations were not very conclusive. Possibly a more interesting result might have been obtained by the use of a more virulent culture of *Staphylococcus aureus*. Of the eighteen animals, two died with typical gangrene around the site of inoculation. Both of these animals (No. 4 and No. 8) had been inoculated with a mixture of *B. oedematis maligni* and *Staphylococcus aureus*. The control animals (No. 3 and No. 7), which were inoculated with the same strains of *B. oedematis maligni* and *Staphylococcus aureus*,

* After our paper had been sent to press there appeared in the BRITISH MEDICAL JOURNAL of December 4th a Note on a Supposed Soluble Toxin, Produced in Artificial Culture by the Bacillus of Malignant Oedema, by G. Barger and H. H. Dale. These workers have been able to prove that the "poisonous substances," the presence of which we suspected, are ammonium salts. The well-marked proteolytic activity of *B. oedematis maligni* is referred to in our paper.

did not develop gangrene. On the other hand, two other guinea-pigs (No. 2 and No. 6), which were inoculated with a mixture of *Staphylococcus aureus* with the same strain of *B. oedematis maligni* as was used in Experiment No. 4, did not develop gangrene. In the case of several of the patients recorded in this series pieces of clothing were removed from the depth of the wound. It is presumed that such fragments, which must be often covered with mud and impregnated with anaërobic bacteria or their spores, may often form the starting-point of gangrene.

In the following four experiments an attempt was made to reproduce these conditions by the introduction of a foreign body heavily charged with anaërobic bacteria. Splinters about ½ in. long were prepared from wooden matches and impregnated with cultures of *B. aërogenes capsulatus* and *B. oedematis maligni*. They were then introduced into the subcutaneous tissues of guinea-pigs.

INOCULATION EXPERIMENTS.—

Series 4.

Experiment 1.—B. oedematis maligni, Strain 8. Splinter inserted on June 26th. The animal was well on June 28th. Marked swelling developed around the splinter on the 29th, and on the 30th the animal was very ill. It subsequently recovered completely.

Experiment 2.—B. oedematis maligni, Strain 8. Splinter inserted on June 26th. On June 28th there was marked swelling around the splinter; animal ill. It died the following day. Inflammation and oedematous infiltration around splinter.

Experiment 3.—B. aërogenes capsulatus, Strain 2. Splinter inserted on June 26th. The animal was well until June 30th, when marked swelling developed around the splinter. Animal very ill, but subsequently recovered completely.

Experiment 4.—B. aërogenes capsulatus, Strain 2. Splinter inserted on June 26th. No symptoms developed.

The series of inoculation experiments with these strains of *B. oedematis maligni* and *B. aërogenes capsulatus* led to the following conclusions:

1. The subcutaneous injection of pure strains does not, as a rule, produce any sign or symptom of disease.
2. If the tissues are damaged by a parasitic micro-organism, foreign body, or other irritant, the introduction of *B. aërogenes capsulatus* or *B. oedematis maligni* may, in a comparatively small number of cases, lead to local gangrene and the death of the animal.

TETANUS.

No. of Case.	Symptoms of Tetanus in Patient.	Prophylactic Injection of Antiserum.	Presence of B. tetani Proved by Inoculation.	No. of Days required for Bacteriological Diagnosis.	Other Anaërobic Bacteria Present.
No. 1	+	0	0	—	B. oedematis maligni. B. aërogenes capsulatus.
No. 6	+	0	+	19	B. oedematis maligni.
No. 10	0	+	+	6	B. oedematis maligni.
No. 14	0	+	+	15	B. oedematis maligni. B. aërogenes capsulatus.
No. 15	+	0	0	—	B. oedematis maligni. B. aërogenes capsulatus
No. 16	+	0	+	13	B. aërogenes capsulatus.

The methods which were employed with the object of establishing a bacteriological diagnosis of tetanus fall under three headings:

1. The microscopical examination of (*a*) films from the discharge from the wound, (*b*) films from the original mixed culture prepared by the inoculation of broth with the discharge.
2. The inoculation of guinea-pigs with the original mixed culture.
3. The isolation of *B. tetani* in pure culture.

1. *Examination of Films.*

In none of these cases were bacteriological forms resembling *B. tetani* found in films made from the discharge. In the films made from mixed broth cultures tetanus forms were observed in Cases 6, 10, 14, and 16, and also in Case 1. By the expression "tetanus form" is implied a slender Gram-positive rod bearing a large absolutely terminal round spore. Microscopical examinations of films from the original broth culture of Case 15 were made on numerous occasions, but no forms resembling tetanus were observed.

In Cases 6 and 16 tetanus forms could not be demonstrated until the mixed culture had been incubated under anaërobic conditions for a relatively long period. Unfortunately no systematic attempt was made to record the number of days which elapsed in each case before bacteria resembling tetanus appeared in the broth cultures.

The following observations were, however, recorded:

	Tetanus Forms not present after	Tetanus Forms present after
Case 1	—	2 days
Case 6	6 days	17 days
Case 10	—	4 days
Case 14	3 days	8 days
Case 16	5 days	10 days

It appears that:

1. Tetanus bacilli are often not found in films made from the discharge from the wound.
2. A long time may elapse before they appear in cultures in sufficient number for microscopical recognition.

A more serious objection to the microscopical method of diagnosis is the fact that closely similar, if not indistinguishable forms, occur in films made from pure cultures of *B. oedematis maligni* and *B. aërogenes capsulatus*. On the other hand, a pure culture of *B. tetani* may often contain many bacilli which are in no way characteristic in appearance. In the absence of other evidence, the discovery of tetanus-like bacilli in films is not satisfactory evidence of the presence of *B. tetani*. The presence in a film of numerous slender Gram-positive bacilli, bearing a large round terminal spore, is, of course, a suspicious circumstance, and may justify a preliminary opinion. The microscopical evidence is, however, not sufficient, unless supported by the result of an inoculation experiment.

2. *Inoculation of Mixed Broth Culture.*

The presence of *B. tetani* was demonstrated in Cases 6, 10, 14, and 16 by injecting a guinea-pig with the original mixed broth culture.

One or two cubic centimetres of the culture were injected beneath the skin on the left side of the chest. After a variable interval—usually two or three days—slight stiffness of the forelimb nearest to the site of inoculation was observed. Within a few hours the limb became rigid in a position of extreme extension. Subsequently a condition of extensor spasm spread to the other limbs and the muscles of the neck and back. Death usually occurred within twenty-four to forty-eight hours after the first onset of symptoms. In the majority of cases there was little or no evidence of inflammation at the site of inoculation. The method is a satisfactory one, and yields results which are not open to doubt. The disadvantage is the considerable interval that may elapse before a demonstrable amount of toxin is produced.

3. *Isolation of Pure Cultures.*

In Cases 6, 10, 14, and 16 tetanus bacilli were found in large numbers in the original mixed broth cultures, and the inoculation of these broth cultures produced characteristic symptoms in animals. In only one of these cases was the tetanus bacillus isolated in pure culture, in the other three cases repeated attempts ended in failure. Agar, glucose agar, and blood agar plates were employed; colonies of *B. oedematis maligni* were readily obtained, but not of tetanus. Fractional heating was employed in the hope that the spore of tetanus might prove more resistant than that of malignant oedema. No success was obtained in this way. A pure culture was eventually obtained by the inoculation of glucose agar plates with the mixed broth culture from Case 16.

Cultural Characteristics.

The surface colonies on glucose agar plates varied greatly in size. They were round, opaque, and rather white. Under a hand lens they showed a central portion which was thicker and made up the greater part of the colony, surrounded by a thin, translucent margin, which had a wavy outline.

With higher magnification the centre of the colony was seen to be granular, while the margin showed delicate rounded projections. In older cultures numerous small circular opaque nodes or thickenings appeared on the colony. These may perhaps be described as secondary colonies. Other colonies showed large branching outgrowths, which were beautifully rounded, and somewhat suggested the contour of an oak-leaf. Streak cultures on glucose agar slopes showed a central thick opaque line and a broad, translucent margin, showing branching and rounded processes. The appearance of agar cultures was similar, but the growth was not so vigorous. Broth cultures became turbid with the formation of a deposit. The growth on Dorset's egg medium was not very vigorous, but resembled that on glucose agar. Flat white colonies appeared, which after a time came to lie in shallow depressions in the medium. No change was produced in litmus milk. The sugar reactions were examined on several occasions with Hiss's serum water, and with peptone water media. This strain produced no change on cane sugar, glucose, maltose, lactose, mannite, dulcite, and inulin.

The microscopical appearances of films from various culture media were recorded. As only one strain was examined, the results have little value.

The appearance of bacilli grown on agar, glucose agar, and broth accorded with the description usually given of this micro-organism. The bacilli were slender, showed considerable variations in length and size, and had rounded ends. The majority occurred singly. Many bacilli contained spores, the majority of which were terminal, round, and very large. In a very few bacilli the spores were oval in shape and were either in the centre of the bacillus or near but not actually at one end. These forms showed a close resemblance to the appearances commonly met with in cultures of *B. oedematis maligni*. In a few of the bacilli there was an appearance of granules similar to that seen in films of *B. aërogenes capsulatus*. Bacilli which appeared to have two terminal spores occurred occasionally. Films made from a three days old culture on Dorset's egg medium were distinctly different in appearance. The majority of the bacilli appeared to be broader than those grown on agar. Although in many bacilli the spore was terminal, there were many others in which it was oval and occupied a central position. Apart from the spore-bearing forms, bacilli occurred in which the poles stained faintly, while the centre appeared as a solid deeply stained band. In other bacilli the arrangement was reversed, and a bipolar effect was produced. Possibly these appearances represent early stages of spore formation.

Inoculation Experiments.

Eleven guinea-pigs and 2 rabbits were inoculated from a ten-day-old pure broth culture of this strain. Tetanus developed in 4 of the guinea-pigs. The other 7 guinea-pigs and the 2 rabbits showed no evidence of the disease.

Remarks on above Cases of Tetanus.

It is perhaps worthy of note that the two patients who did not suffer from tetanus although the presence of tetanus bacilli was demonstrated in the wounds had received a prophylactic injection of antitoxin. The four patients who developed signs of tetanus did not have a prophylactic injection. In Cases 10, 14, 15, and 16, fragments of clothing were removed from the wound. It may be assumed that the presence of fragments of cloth, saturated with the discharges of a gangrenous wound, must form a peculiarly suitable nucleus for the growth of tetanus bacilli.

The results above recorded lead to the conclusion that the microscopical examination of films made from the discharge from a wound may be of little value in the diagnosis of tetanus. Satisfactory results may be expected from the injection of guinea-pigs with broth which has been inoculated from the discharge. Prolonged incubation may be necessary before a positive result is obtained. Under these circumstances the patient may develop tetanus before a diagnosis is arrived at in the laboratory. Now the tetanus bacillus belongs to the same group of bacteria as do *B. aërogenes capsulatus* and *B. oedematis maligni*, and the demonstration of the presence of these two micro-organisms is a relatively simple and rapid matter. All three micro-organisms are of intestinal origin and are apt to be found in polluted soil. All three are no doubt frequently simultanously introduced into a wound, and all three require the same conditions for growth and multiplication. The presence of either *B. aërogenes capsulatus* or *B. oedematis maligni* might with great advantage be taken as an indication for one or more prophylactic injections of antitetanus serum. In two at least of the above cases the first symptoms of tetanus followed immediately on an operation, and it appears to us that antitetanic serum should be injected as a prophylactic measure before any considerable operative procedure is attempted on a patient with a gangrenous wound.

Since the conclusion of this investigation two other cases have been observed in which the onset of tetanic symptoms was apparently determined by operative procedure.

TREATMENT.

In the summary of our cases no reference has been made to treatment, and we did not in the first instance contemplate any reference to the matter. It may, however, be remarked that the results obtained were, considering the gravity of the majority of the cases, satisfactory; and as the bacteriological findings exhibited a marked uniformity, a brief note on the general lines of treatment may be of some interest. Cases 17 and 18 received continuous irrigation with hypertonic saline. In the other sixteen cases treatment consisted of irrigation with hydrogen peroxide (5 to 10 vols.) and fomentations of hot sterile isotonic saline solution (0.9 per cent.) or boracic lotion. In the later stages, when the wounds had cleaned up, lotio rubra and gauze dressings were employed.

After the conclusion of this investigation, irrigation with hypertonic saline solution was employed in more than 100 cases which presented similar features to those above recorded. The method caused considerable discomfort to the patients, and did not yield results in any way superior to those obtained by the use of older methods of treatment. In this connexion it may be noted that active phagocytosis was often observed in films prepared from the discharge of wounds which had been treated by the usual methods.

B. aërogenes capsulatus and *B. oedematis maligni* were frequently isolated from wounds in which no gas was produced and the gangrenous area showed no tendency to spread. It may be inferred that the conditions which enable these micro-organisms to exercise any serious influence in the course of a case are only exceptionally present. These micro-organisms are essentially saprophytes, and are relatively, if not entirely, innocuous to undamaged living tissues. The presence of dead tissue or fragments of clothing and the retention of discharge or blood clot within a wound provide these micro-organisms with a favourable culture medium. It is of the utmost importance that wounds containing anaërobic bacteria should be freely opened up and thoroughly drained.

SUMMARY.

1. The series comprises 18 cases of gangrenous wounds, of which 3 only were fatal. Included in this total are 4 cases of tetanus (1 of which was fatal), and 4 cases of gas gangrene (2 of which were fatal). Of the 18 cases *B. oedematis maligni* was found in 15 and *B. aërogenes capsulatus* in 13.

2. *B. aërogenes capsulatus* and *B. oedematis maligni* are apparently possessed of powerful enzymes. The former is peculiarly able to attack carbohydrates, the latter proteins. Dorset's egg medium is an admirable medium for both micro-organisms.

3. The shape, size, staining reactions, and capacity for spore formation of these bacilli are profoundly influenced by the nature of the culture medium.

4. On Dorset's egg medium the majority of the bacilli are typical in shape, uniform in size, and Gram-positive. On media which contain a carbohydrate, from which the bacilli can form acid, growth is at first rapid and vigorous, but after a few days the bacilli become atypical in appearance, vary greatly in size, and the majority are Gram-negative.

5. *B. aërogenes capsulatus* forms spores on Dorset's egg medium and inspissated serum, but not on media in which an acid reaction is produced. *B. oedematis maligni* forms spores less readily in acid media.

6. The presence of *B. aërogenes capsulatus* and *B. oedematis maligni* is not necessarily associated with the development of gas in the tissues.

7. *B. oedematis maligni* and *B. aërogenes capsulatus* are essentially saprophytes. They have little or no power to multiply in living tissue. In dead tissue they grow

rapidly and produce poisonous substances, by which the adjacent living tissue is destroyed and rendered a suitable medium for the further multiplication of these bacilli.

8. *B. tetani* was not found in films made from the discharge in any one of the six cases of this series in which it was present.

9. The recognition of *B. tetani* by purely microscopical methods is complicated by the fact that slender Gram-positive rods bearing an absolutely terminal spore may be occasionally found in pure cultures of *B. oedematis maligni* and *B. aërogenes capsulatus*. Moreover, pure cultures of tetanus bacilli, especially cultures on egg medium, contain many atypical forms.

10. If broth is inoculated with material from the wound in a case of tetanus, and incubated under anaërobic conditions, the presence of *B. tetani* can often be satisfactorily demonstrated by animal inoculation. Such a broth culture should be examined at intervals, and two or three weeks may elapse before *B. tetani* can be demonstrated.

11. The presence of *B. tetani* was demonstrated in the discharge from the wounds of two patients who did not develop signs of tetanus. Both had received prophylactic injections of antitetanus serum.

12. The discovery of *B. tetani* in the wounds of a patient who had not developed tetanus would obviously be an indication for one or more prophylactic injections of antitetanic serum. But the practical utility of such a procedure is limited by the difficulty and delay which attend the bacteriological recognition of this bacillus. Now, *B. tetani* belongs to the same group of anaërobic bacteria as *B. aërogenes capsulatus* and *B. oedematis maligni*. All three have probably a common source, and the conditions favourable to their growth within a wound are probably identical. The demonstration of either *B. oedematis maligni* or *B. aërogenes capsulatus* is a relatively simple matter and does not involve much delay. The discovery of either of these bacilli might with advantage be followed by a prophylactic injection of antitetanic serum.

13. A prophylactic injection of antitetanic serum should be given before any considerable operation is performed on a patient with a gangrenous wound.

THE TREATMENT OF ACUTE TOXAEMIA SECONDARY TO GAS GANGRENE BY THE INTRAVENOUS INJECTION OF A SOLUTION OF HYPOCHLOROUS ACID.

BY

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(Report to the Medical Research Committee.)

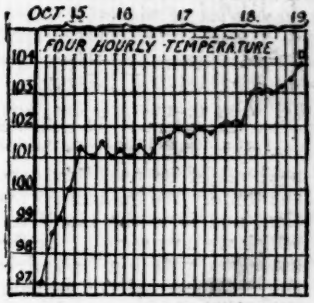
IT has been our experience that soldiers whose wounds are infected by a gas-producing organism sometimes suffer from a condition which can only be described as an intense toxaemia and which frequently proves fatal.

Such cases present features as follows: The patient is admitted to hospital suffering from a wound of one of the extremities; there is extensive infection by a gas-producing organism, and it is obvious that the infected part must be amputated as soon as possible.

In some of these cases, although the operation is carried out, it is found that the general symptoms and signs of toxaemia do not abate but develop and deepen till death ensues; the following two cases are illustrative of these facts:

CASE A.

A sergeant-major, admitted on October 15th, 1915, suffering from a gunshot wound of the left upper arm a short distance below the shoulder-joint. There was a complicated compound fracture of the humerus, and the brachial artery was divided. The wound was infected by a gas-producing organism, and the infection was spreading in the surrounding tissues. His general appearance was that of a man who was suffering from severe haemorrhage; he had an intense grey pallor, and this was the more extraordinary because inquiry showed that the loss of blood had not been excessive; his features were distressed. The pulse was 130, the temperature (see Chart) 97° F., and the respirations 24. He was suffering from the condition of general toxaemia which so closely resembles shock. It was decided that amputation was necessary, but the operation was delayed for some time in the hope that matters might improve. After some hours there was no improvement and disarticulation through the shoulder-joint was carried out.



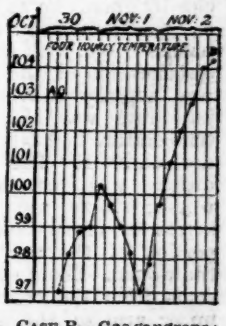
CASE A.—Gas gangrene; disarticulation through the shoulder-joint on October 15th. D, Death.

At the operation the fact was confirmed that the loss of blood was not severe, for the vessel at its site of division was twisted into a fibrous cord.

The post-operation history was disappointing, not as regards the local condition—for no trace of infection developed in the stump—but in regard to the general condition. The pallor remained, and, if anything, deepened; there was a faint underlying tinge of jaundice, there were profuse perspirations and occasional rigors, the pulse-rate increased to 150, the respirations quickened from 24 to 60, unconsciousness developed, and he died on the fourth day following the operation. After the amputation of the diseased limb there was no local site which could be regarded as the source and origin of the poisoning from which the man was suffering. A process of reasoning led to the conclusion that there was proceeding either a septicaemia or a toxaemia which had originally been instituted from the infected wound. A blood examination was carried out by Captain Ellis, but no organism could be isolated. The process was apparently, therefore, a toxaemia.

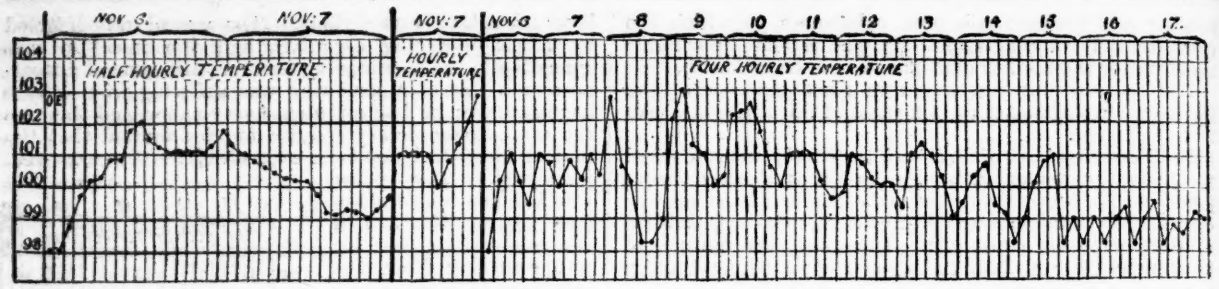
CASE B.

A private, admitted on October 30th, 1915, suffering from a gas-infected wound of the right leg. Generally he presented an appearance very similar to that of Case A—an intense pallor as though from severe loss of blood, restlessness and sweating; the temperature was 97° F., and the pulse 140. The right limb below the knee was extensively infected with a gas-producing organism; the bones were not injured, but the main blood vessels were involved. It was decided that amputation was necessary, and this was carried out through the knee-joint under spinal anaesthesia. After the operation the stump did well, but the general condition was far from satisfactory; the temperature rose and remained high; the pulse increased in rapidity and became weaker. On the morning of the second day after the operation the patient seemed better, but immediately after being dressed he collapsed and died.



CASE B.—Gas gangrene; amputation through the knee-joint on October 30th. A, Admission; O, operation; D, death.

We have chosen these cases at random from amongst others. To our minds they are illustrations of cases suffering from intense toxaemia. The removal of the original and local source of the toxaemia was not sufficient to counteract the malady, for the poison had acquired so firm a hold that its continued activity led to the death of the patients. The counteraction of the toxaemia formed a very distinct problem, and while it was under consideration Professor Lorrain Smith of Edinburgh suggested to us that eusol, which contains 0.5 per cent. hypochlorous



CASE C.—Gas gangrene; wound opened up on November 5th; amputation below the shoulder-joint on November 6th, injection of 40 c.cm. eusol at the same time. The chart shows the temperature taken every half-hour on the day on which the operation was performed and the following day. O, Operation. E, Eusol 40 c.cm. injected intravenously.

acid, might be used intravenously to combat the action of the toxin. We immediately put the suggestion into execution, and it is the result as demonstrated in three cases which we now record. Professor Lorrain Smith and those associated with him had advised us of certain experiments they had carried out proving that eusol containing 0.5 per cent. hypochlorous acid could be injected intravenously into rabbits in amounts up to 25 c.cm. without any ill effects arising.

We repeated these experiments and assured ourselves of a similar result. Thus safeguarded, we proceeded to use the solution intravenously in the treatment of toxaemia secondary to wound infection with a gas-producing organism.

CASE C.

A private was admitted on November 5th, 1915. Forty-eight hours before admission he had been struck by a bullet on the right forearm just below the elbow. The wound was dressed, but he could not be evacuated from the trenches until about twenty-four hours later.

On admission, there was found to be a gaping and ragged wound of the forearm below the elbow-joint; the bones were not broken; the main blood supply was interrupted, as no pulse could be felt in either radial or ulnar vessels. The wound was sloughing, and apparently infected by a gas-producing organism. The general condition was bad; he had an unhealthy toxic appearance, and was somewhat blanched. The temperature was 100° F., and the pulse 120.

As there was some evidence of a collateral circulation being established, attempts were made to conserve the limb. Under anaesthesia the wound was thoroughly opened up; various fascial planes were exposed, and the parts were freely dressed with eusol.

On the morning of November 6th the patient was distinctly worse; sleep had been broken and imperfect. His general appearance was decidedly grave; he was blanched as though from a severe haemorrhage, with a yellowish discoloration of the skin. He was slightly delirious. The pulse-rate was 150, and the temperature had fallen to subnormal, 98° F. The local condition was correspondingly worse; there was complete arrest of circulation in that portion of the arm distal to the wound. There was emphysema from the centre of the upper arm to the neighbourhood of the wrist; there were patches of a bluish discoloration of the skin, and the muscles in certain parts showed distinct necrosis.

At 3 p.m. the arm was removed just below the shoulder-joint, and immediately after the operation 40 c.cm. of eusol were injected intravenously. From this time the temperature rose almost continuously for three hours, and at 7 p.m. it had reached 102° F.; the pulse-rate likewise correspondingly increased from 120 to 160. Immediately after operation it fell from 150 to 120 and then rose again. From 7 p.m. until midnight the temperature remained at about 102° to 101° F., and the pulse remained about 160 (see Chart). Soon after midnight the temperature began to fall until at 8 a.m. on November 7th it had reached 99° F.; the pulse likewise fell from 160 to 108.

During November 8th, 9th, and 10th there were successive rises of temperature, usually occurring in the early morning and accompanied by corresponding increases in pulse-rate. On November 15th the temperature fell to normal and remained so.

There were other changes to be noted in addition to those in pulse and temperature. The general appearance improved by leaps and bounds; the ashy pallor disappeared within twenty-four hours, to be replaced by a slightly flushed appearance. The respirations altered strikingly; previous to operation and injection of eusol the respirations were deep and slightly stertorous, such as gave us the impression of a sense of air hunger. Subsequent to operation and injection they became quicker, shallower and less noisy. Shortly after operation and injection the restlessness disappeared and the patient slept comfortably.

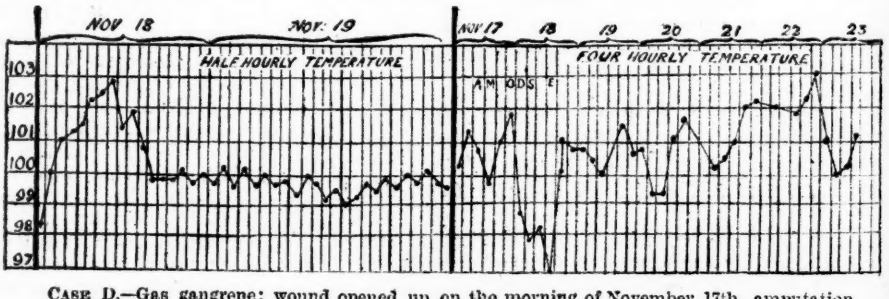
The further progress was one to complete recovery.

Immediately before the injection of eusol was given blood was taken for bacteriological examination; both aërobic and anaërobic cultures were negative.

CASE D.

A private, admitted on November 16th, 1915. About twelve hours before admission he had sustained a bullet wound through the left arm about the level of the elbow joint. There was considerable bleeding and a tourniquet was applied. Beyond a simple dressing nothing further was done, and the patient was sent into hospital with the tourniquet still in position.

On admission it was found that the brachial artery was severed immediately above its division; the vessel was tied. There was no definite evidence of infection in the wound, but it was thoroughly opened up and treated with eusol. There were signs that an adequate collateral circulation might be established.



CASE D.—Gas gangrene; wound opened up on the morning of November 17th, amputation same evening. Injection of eusol 40 c.cm. at 3.15 p.m. on November 18th. A, Anaesthetic; wound opened up, etc. M, Morphine, gr. ½. O, Operation. D, Digitalin, gr. 1/100. S, Saline, 3 pints. E, Eusol, 40 c.cm., intravenously at 4 p.m.

On the morning of November 17th the general condition of the patient was unsatisfactory; he had had a restless night, and there was some evidence of gas in the neighbourhood of the wound. The wound and fascial planes around were further opened up. He was pallid and slightly jaundiced, restless, and sweating slightly.

At 10 p.m., on dressing the wound, it was found that the condition had become much more extensive. There was gas throughout the forearm and extending upwards along the vessels as far as the axilla. It was obvious that operation was necessary, and at 11.30 p.m., the arm was amputated below the shoulder-joint and partly through the infected area. After the operation there was evidence of collapse; the temperature fell to 98° F., the pulse was 126.

Stimulation was carried out with saline, 3 pints subcutaneously, and digitalin $\frac{1}{150}$ grain.

During the morning of the 18th the condition became more serious; the temperature continued to fall, and reached 97° F.; the pulse increased to 126–124; the respirations were full and stertorous, resembling a condition of air hunger. The general appearance was one of pallor with a tinge of jaundice. At 2 p.m. the condition had become so serious that it was obvious that something further ought to be tried, therefore at 3.15 p.m. 40 c.cm. of eusol were injected intravenously with a Record syringe. Before injection a blood examination was made, but no organism was isolated.

At 4 p.m. the temperature was 98.6° F. and the pulse 136; there was no obvious change in general condition. At 4.30 p.m. the temperature was 100° F. and the pulse 136; at 5 p.m. the temperature was 101° F. and the pulse 136; and at 7 p.m. 102.5° F. and 140 respectively. By this time also there was a change in the general condition; he was sleeping peacefully; respiration was quicker and quite quiet; his colour had improved, and the pallor was replaced by a slight flush.

By midnight the temperature had begun to fall and was 100° F.; the pulse was 120.

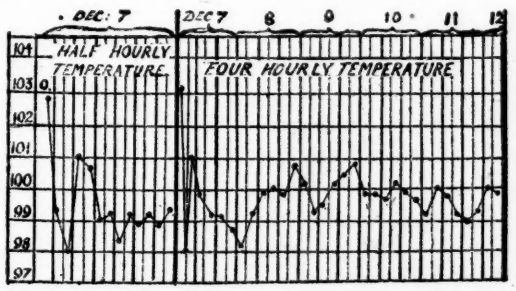
On November 19th his condition was greatly improved; the temperature was 99° F., the pulse 100; he was sleeping well and taking nourishment, and the local part looked well.

The further progress was one to uninterrupted recovery.

Some of the facts in regard to this case call for special attention. The operation of removal of the arm did not produce any benefit; in fact, after it the general condition grew steadily worse. The collapse was so intense that it was thought to be the result of loss of blood; but the reaction after the intravenous administration of eusol was so correspondingly great that we had no hesitation in saying that the alarming symptoms were the result of an intense toxaemia. The eusol was not given until sixteen hours had elapsed from the time of operation; and before the drug was given we were agreed that the prognosis was absolutely hopeless.

CASE E.

A private was wounded in the calf of the right leg by a shrapnel bullet on the afternoon of December 6th, 1915. He was admitted to hospital on December 7th about midday. The neighbourhood of the wound was found to be infected by a gas-producing organism. The general condition was bad; there was pallor as though from loss of blood; the temperature was 100° F., and the pulse 120. Arrange-



CASE E.—Gas gangrene; amputation through the knee-joint on the afternoon of December 7th. Injection of 70 c.cm. eusol. The chart shows the variation of temperature at each half hour during the first six hours after the operation. o, Operation, 70 c.cm. eusol intravenously.

ments were made to have the wound opened up, but pressure of work rendered it impossible to have this done until 2.30 p.m. (two and a half hours after admission). At this, the second, examination it was found that the condition had become much graver: the leg below the knee was enormously swollen; it was as resonant as a drum from knee to toes, and signs of infection had extended along the line of the femoral vessels as far as the centre of the thigh; there was an entire arrest of circulation in the foot and leg. The general condition was correspondingly worse; the temperature had reached 102.5° F., and the pulse-rate was 130.

Half an hour later, when the patient was in the operating theatre, a further advance had been made which we could hardly have believed possible in so brief a space of time. In places the skin of the leg was becoming mottled as the result of actual tissue necrosis; the gas infection of the thigh had extended upwards as far as the groin. The general condition had become correspondingly worse. Disarticulation through the knee-joint was performed by the Stephen Smith method; it was necessary to cut through infected tissue, but former experience had told us that this could be done. The cutting of the flaps revealed green, foul-smelling subcutaneous tissue; free incisions were made along the whole length of the femoral artery as far as the groin; the knee-flaps were left open and drainage of the thigh wounds was thoroughly secured. Before the patient left the theatre 70 c.cm. of eusol were injected intravenously; the dose was larger than usual because from our former knowledge of such cases we took an exceedingly grave view of this case.

His history after operation exceeded even our most sanguine expectations; there was no further appearance of gas formation or gangrene, and forty-eight hours after operation his pulse-rate had fallen to 88. His condition in the future never gave us the slightest cause for anxiety. Under usual circumstances we should have regarded this case as very likely to prove fatal, or at least to have recovered only after a prolonged period of debility.

Blood Cultures.—These were made for both aërobic and anaërobic organisms. For the aërobic ordinary plates of 1 per cent. glucose agar were employed, and 1 c.cm. of blood was introduced. Three kinds of anaërobic cultures were made use of in each instance: (1) Plates as above, but grown in a carbon monoxide atmosphere; (2) 1.0 c.cm. of blood in litmus milk in a Buchner tube; (3) 1.0 to 2.0 c.cm. of blood in an ordinary shake culture in deep 1 per cent. glucose agar tubes.

COMMENTARY.

There is really very little which we wish to add of the nature of a commentary. The position, briefly, is as follows: We were faced by the fact that men suffering from an infection of their wounds by a gas-producing organism frequently succumbed to what to our minds appeared to be an intense and progressive toxaemia. The first two cases (A and B) which we have described are illustrative of such a condition.

We found extreme difficulty in antagonizing and treating these toxaemias. Following Profe-sor Lorrain Smith's suggestion, we are now using intravenous injection of a solution containing 0.5 per cent. hypochlorous acid (eusol) for this purpose, and, to our minds, the results which we have obtained most thoroughly justify the adoption of the method. We have quoted three cases illustrative of the treatment (Cases C, D, and E). Before the injection of the hypochlorous acid solution these were, in our opinion, as dangerously ill as the two illustrative cases (A and B) which we have described, and we believe that the eventual recovery which the three (C, D, and E) made was due to the action of the hypochlorous acid.

A striking feature of Cases C and D is that at the time of the operation the patients were in a condition of collapse, as was evidenced by the progressive fall in temperature and the general state. In Case D the collapse continued for fourteen hours after the operation. The disappearance of the signs of collapse took place after the intravenous injection of eusol. In both cases (C and D) the injection was followed by an immediate rise of temperature. This is to be looked upon as a sign of reaction, for even during the pyrexia a clinical improvement became evident, and the fever was a precursor of steady recovery.

Case E indicates that it may sometimes be advantageous to give a larger dose. In a note on the successful treatment of a case of puerperal septicaemia by intravenous injection of eusol, published by Lorrain Smith, Ritchie and Rettie, it is stated that an injection of 100 c.cm. eusol was given, and this was repeated after twenty-four hours without any indication of untoward effect on the patient.[1]

The solution employed for injection was eusol containing 0.5 per cent. hypochlorous acid, to which was added 8.5 grams of sodium chloride per litre. The solution was carefully standardized before injection. The injection was made by means of a Record syringe into the median basilic vein. In two instances 40 c.cm. of hypochlorous acid (eusol) were injected; we were prepared to repeat the injection, but the recovery was so progressive that

repetition was not necessary. In the third case 70 c.cm. of cusol were injected.

We wish to acknowledge our indebtedness to Lieut.-Colonel West, R.A.M.C.(T.), for permission to study these cases; also to the staff of the Canadian Mobile Laboratory, who carried out the necessary bacteriological work.

REFERENCE.
1 BRITISH MEDICAL JOURNAL, November 13th, 1915.

NOTES ON CLOTHING AGAINST COLD.

BY

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SUPERINTENDENT OF LABRADOR MEDICAL MISSION, ROYAL NATIONAL MISSION TO DEEP SEA FISHERMEN.

THE following brief notes are founded upon experience gained in Labrador and North Newfoundland during the last five-and-twenty years; they express not only my own opinion, but the winter practice of those who live and work in the countries mentioned.

The source of heat being the body, and the chilling of the body being the result of loss of heat, we design our garments against this issue, and I may say at once that we do not use india-rubber boots or any waterproofed garments.

Exercise being conducive to increased production of heat, we make our clothing very light and see that the material is as far as possible (1) thin and pliant, (2) wind and waterproof, (3) durable, (4) inexpensive.

We always use two layers of light material instead of one layer of heavy. We never use flannel or wool outside, but as it contains air spaces and can be woven thick, soft, and light, we use a thick undergarment and a very light outside one. The colder it is the thinner material we use for boots, because it is more pliable.

Jumper.

The general plan of the upper garment is always the same. To adapt it for use in Europe in mild climates where rain is frequent we should use light Willesden canvas outside, or Burberry or light waterproof rubber material. When very cold we wear a second loose one underneath. The essential point is that there shall be no draughts.

1. At the neck draughts are avoided by making the capot, or hood, continuous with the body piece.

2. Leakage in front is avoided by making the jacket in one piece and getting into it from below.

3. Leakage below is avoided by a canvas or webbing belt fastened on to the lower edge of the jacket, or heavy elastic sewed in, or a soft pliable thong running through a gusset.

4. Leakage through the arm is avoided by a rubber band round a reversed cuff inside (as shown in Fig. 1), or

FIG. 1.—Showing the jacket (jumper) and the hood (capot); also the harness for carrying gloves. The waist band and the left wrist band are open.

webbing strap sewn on the outside edge of the sleeve cuff, exactly as the belt is attached.

5. Leakage round the face is stopped by a draw string round the opening.

The best belt fastenings are without any buckle, but have glove push-fastenings and a thong going through an eye. They can be opened and closed in a moment with gloves on.

In hot weather the sleeves and belt can be loosened and the hood thrown back, so that the wearer has a cool light garment. It is a funnel through which air blows. There is no garment on earth to beat it; it cramps nothing, no snow can get inside, nor can rain, especially when two are worn. It is the next thing to a diver's suit when in use, and makes a splendid bag or sack when not in use. With No. 2 canvas it can be used as a wash-basin if wanted. The breath can also be kept in more or less to add to warmth at a pinch, if the capot is loose enough. We often carry light articles in our capots as we run along by the sledges. When in extreme cold we use two; one is often of mere calico over one of duffel or blanket. The canvas is easily cleaned from mud when dry. There are no folds to catch on obstructions.

Gloves and Mitts.

Our mitts, when we are shooting, have the right index separate. All our gloves are double, the outside being skin, or wind-proof material, light and soft, and water-tight if possible. The inside mitt is woollen and soft and thick. The glove always goes over the sleeve, and has a strap as well round the wrist (Fig. 2). The inside glove

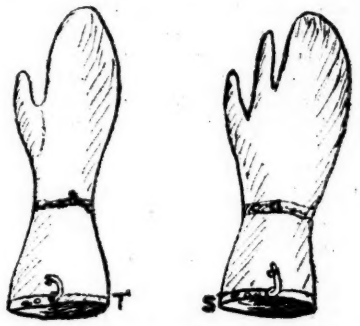

FIG. 2.—T, Travelling glove or mitt. S, Shooting gloves. The strap at the wrist is of canvas or rubber; the upper strap is of canvas.

alone might have a separate index finger. Lastly, we suspend the outside mitts by a string round our necks, so that we can leave them dangling when we throw them off in a hurry.

Trousers.

For trousers we use the same material as for the jumper, canvas or "duck" (Fig. 3). We find the chest

FIG. 3.—Side and front view of trousers. The braces are sewn on to the trousers at the back. They are usually made of canvas, but might be of elastic. When desired the knee strap can be loosened and the trousers worn as running shorts outside the boots.

flap coming right up from the breeches a very great saving of heat. The back should also be above the waist; there can then be no leak of heat. The trouser always goes well inside the boot tops. We use no opening for urination—the trouser is all in one piece. A flap might be made if necessary, but we want no draughts.

Boots and Socks.

For boots we use sealskin and deerskin. Deerskin boots are the warmest, but are not watertight; we use them in hard frost.

Our boot materials are, as are all our garments, soft, light, and water and wind tight (Fig. 4). There are no nails and no pegs. The sole is soft; we use no thread; all are sewn with tissue from tendons, and as these swell with wet they never leak. We soak the boot or rub it over with tar and oil. It wants careful treatment to keep it from tinting or rotting, as we use raw or green skins. These are the most watertight. The hair is shaved off, and so there are no holes left in the leather. Occasionally we tan these skins and then soak them in tar and oil. It would be hard to get any number of these boots from Labrador now, as the coast is shut off from communication. They could not be obtained in any quantity till autumn, though a few thousand pairs of the tanned boots might be obtained in a few months, especially if the old sealskins from the Newfoundland fishery were purchased for the purpose. I think, however, skins of pigs or goats or dogs, and possibly sheep, would serve just as well. The features are, first, that they should be absolutely soft and very thin, so that the foot can move in every joint and keep warm. They are large and loose, and strap or tie round the knee. Very often, especially in spring, we carry the boot above the knee and tie it again, as then we can kneel to shoot or crawl on wet ground. The boot will take easily three pairs of socks. Very often in wet weather we use a pair of shoes of the same material, or of tanned skin inside the boot, and then two pairs of socks. These will keep dry on wet ground all day. The outer thin boot when of tanned skin "seeps water" a little, and the inside shoe keeps that from the sock. The looseness of the boot would prevent anything like "trench foot" from pressure. The boots are perfectly good on stony ground, the number of socks inside prevent the stones cutting the boot, and very soon the wearer does not notice the inequalities. We use them often, long after all the snow is gone, on our rocky hills and shores.

FIG. 4.—Boot.

The sewing is always done with sinews. The fascia lumborum of the deer is dried and thread made from it by tearing the fibres and twisting them. This swells with the wet and prevents any leaking. Also the sewing is done exactly like sewing bowel; the stitches go only half way through the skin.

To demonstrate the way they resist water I would say our kajaks, one of which I always use for shooting on the sea, are only of one single layer of this sealskin, sewn together with this same sinew in this way, and they never leak a drop. I have driven my kajak through rough water, hunting all day, and never got damp even. One can run and jump in this costume as one did in football flannels. Among our doctors we have had more than one 'varsity runner and other athletes, and it is the unanimous opinion that when we get rid of our hard boots at the beginning of the winter, and abandon our conventional European clothing we begin to know what ease and comfort in moving is, and what resisting cold and wet means. There is no hard boot made that will save a foot from frost-bite. The sealers travelling over the sea ice put a thin tap or sole, pegged into our thin sealskin boot, so that they can screw in the "chisel" and "sparble" that prevents slipping.

This soft boot also allows yet another very important improvement over any hard boot. There is so much room in the boot that if the feet are cold and wet socks can be discarded and grass or hay used instead. The hay is just twisted into a hank loosely and bound round the foot, enough to enable one to distribute it around in the boot. A wisp is first put into the toe and on the sole. Hay is cheap—grass is easy to get. The air spaces are very warm. It takes a lot of water to wet hay. The foot sweats less in hay than in wool. There is no reason, however, why one sock should not be worn inside the hay. When hay is wet, it can be changed by putting it into the cap or capot to dry from the heat of the body, as a scout does his matches. The "Lap" always uses grass in his skin boots, and wears the change grass in his tam-o'-shanter or knitted cap. The soft wading stockings are rendered almost useless in a hard boot—as the boot must be large and clumsy. They could readily be used in a perfectly soft boot.

A vamp is a low shoe made in wool (Fig. 5). The shops sell them. But much the best are those we make by

FIG. 5.—A, Vamp in knitted wool. B, Cross sections of vamp with wisps of raw wool drawn in. C, Vamps one over the other.

knitting the vamp, and then drawing in wisps of raw wool through the meshes, so that all the raw wool is inside. This gets trodden into a thick soft layer. The wool can be left greasy if preferred. It is very warm, and not easily wetted. To show how soft a boot is I would add that when one is wet and it has been taken off we turn it inside out and hang it up to dry. If a raw skin boot is hard, when we are putting it on we rub it on a boot stick and break it soft again, or just throw it in a bucket of water. The boots are so light that a spare pair could easily be carried to the trench and used as a pair of waterproof bags for rations if necessary. We never use any overcoat, hard hat, or hard belt, or any clumsy, heavy, hard contrivance at all.

Lice and fleas cannot breed in canvas and linen, as they can in hairy sheepskins and goat, and the heat necessary can yet be retained.

CHLORAMINE IN THE TREATMENT OF WOUNDS OF THE MOUTH AND JAWS.

BY STAFF SURGEON A. R. FISHER, R.N.,
H.M. HOSPITAL SHIP "REWA."

(Report to the Medical Research Committee.)

THE septic character of all gunshot wounds involving the mouth and the disadvantages attending the use of the common antiseptics led me to try in these cases a new agent—chloramine (toluene sodium sulphochloramide).

The suggestion was made to me by Dr. H. D. Dakin, by whom the preparation was made. He advised a 2 per cent. aqueous solution for use as an irrigant and mouth wash.

During the months of October, November, and December, there was a great falling off in the number of surgical cases received on board this ship, but I was able to try the effect of this agent in seven cases, and in all the result was highly satisfactory. Where necessary, the usual surgical procedures were carried out under an anaesthetic, such as the opening up of external wounds, the removal of loose bone, teeth, foreign bodies, and ragged portions of tissue, the arrest of haemorrhage, and the suturing where possible of severed tissues—for example, the soft palate. Tubes were inserted through the wounds and the mouth to allow access of the injected fluid to all the damaged surfaces. The external wounds were dressed in the usual way, but the distal ends of the tubes were allowed to project outside the bandage, so that the reagent could be introduced frequently without disturbing the dressing. Irrigation was carried out every hour during the day, and as often as possible during the night, the patient sitting up in bed. Three or four syringefuls (2 oz. capacity) were injected through each tube, the fluid returning through the mouth into a receptacle. The patient was fed through a tube, irrigation with the chloramine solution being carried out immediately before and after.

Chloramine, besides being a powerful antiseptic, has the property of penetrating the tissues, and is not so readily neutralized by albuminous discharges as the simpler chemical antiseptics; also it is bland and quite pleasant to use, being non-irritant.

Of the 7 cases treated with chloramine, 5 were compound fractures of the jaw and 2 were flesh wounds involving the mouth. The following are clinical notes of these cases:

CASE I.

P. C., wounded at Anzac on October 6th, was operated on nine hours later under an anaesthetic for a rifle-bullet wound of the upper jaw. The bullet had entered the right cheek just below and in front of the malar prominence, shattering the right supramaxilla, ploughing up the soft palate, removing some teeth of the left upper jaw, and then passing through the left cheek, leaving a large ragged wound. The wounds and surrounding skin were cleansed with hypochlorite solution, the ragged edges cut away, and many small fragments of bone removed. A tube was inserted through the exit wound into the palate region and another through the mouth; the latter was kept in position by a safety-pin through the bandage. The mouth was irrigated every two hours with chloramine and the wounds dressed twice daily. He was fed every four hours through the tube.

Six days later he was able to gargle for himself and drink fluids. On October 18th he was discharged to H.M.H.S. *Aquitania*. The wounds had remained clean, and there had at no time been any purulent discharge or offensive smell from the mouth. I am informed that ten days later he was landed in England with the wounds almost healed and the mouth condition satisfactory.

CASE II.

F. L. sustained a shrapnel wound of the right upper jaw on October 13th at Helles. He was received on board twenty-four hours later suffering from marked dyspnoea. Under chloroform he was found to have a compound fracture of the right upper jaw and laceration of the palate. The wounds were cleansed, and a shrapnel bullet and a tooth were removed from the posterior pharyngeal wall. No tubes were inserted. The patient was able to gargle frequently with chloramine and to drink fluid.

On October 18th he was discharged to H.M.H.S. *Aquitania*. During this period the breath remained inoffensive and the tongue clean.

CASE III.

W. G. T. was wounded at Anzac by shrapnel on October 27th. Two days later he was received on board, and examined under an anaesthetic. He was found to have extensive flesh wounds of the right arm, and a compound fracture of the right lower jaw; all wounds were very septic and the breath fetid. The wounds were irrigated and dressed with hypochlorite, and a chloramine mouth wash ordered to be used every two hours.

On November 2nd, when the patient was discharged to hospital at Malta, the external jaw wound had cleaned up considerably, all surrounding inflammation had subsided, and only a slight purulent discharge remained; the mouth had become quite clean, and the breath inoffensive.

CASE IV.

T. G. was wounded at Suvla on November 8th. An operation was performed sixteen hours later for a penetrating rifle bullet wound; the entrance was at the right mastoid process, and the exit through left cheek; it had injured the base of the skull, the hard palate, and the left supramaxilla. The right ear was cleansed with hypochlorite and plugged with gauze. The wound of entrance, through which cerebro-spinal fluid was leaking, was cleansed and dressed, and a tube inserted through the exit wound into the palate. Daily dressing and hourly irrigation with chloramine was used.

On November 13th he was discharged to hospital at Alexandria, the wounds clean, and the mouth being inoffensive.

CASE V.

W. T. received on December 7th, near Salonika, a rifle bullet wound at the angle of the left lower jaw, causing compound fracture of jaw. There was no exit wound.

He was received on board this ship on December 14th; the wounds were very septic, the mouth foul, and the breath exceedingly offensive. There was much submaxillary swelling and adenitis. The external wound was treated with frequent hypochlorite dressings and the mouth with chloramine wash. The condition rapidly improved, the oral discharge decreased, and the submaxillary swelling subsided. On December 20th a bullet was detected lying on the right side deep to the floor of the mouth. It was extracted through a skin incision. The patient is now making a good recovery.

CASES VI AND VII.

The other two cases were both recent flesh wounds involving the buccal cavity, but not injuring bone. They both remained clean and healed in a few days.

The number of cases treated is small, but the results were so encouraging that a short account of this method may be of value. No such rapid and satisfactory results have followed the application of the antiseptics commonly in use.

COMBINED PREVENTIVE INOCULATION AGAINST TYPHOID AND PARATYPHOID FEVER AND BACILLARY DYSENTERY.

BY

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(*Preliminary Note.*)

IT has been shown by Widal, Sicard, Castellani, and others that the employment of mixed bacterial vaccines has a sound experimental and clinical basis, and marked success has followed the use of a mixed typhoid + paratyphoid A + paratyphoid B vaccine for preventive inoculation both in Europe and German South-West Africa.

We have made investigations into the possibility of amplifying the scope of preventive inoculation so as to afford protection not only against typhoid and the paratyphoid infections but also against bacillary dysentery. The intense toxicity of *B. dysenteriae*, especially in the Shiga strains, constitutes a serious difficulty in regard to the use of dysentery vaccine. In a short note published in the BRITISH MEDICAL JOURNAL of August 8th, 1914, Broughton-Alcock points out that this may be largely overcome by submitting the bacteria to a treatment with normal heated serum, and by employing this technique he was able to use doses of 350 and 700 million dysentery organisms in some 200 cases, producing reactions which were never marked nor inconveniencing. The reduction in the amount of local reaction is due to a non-specific action of the serum on the bacilli. Our method depends upon the use of a dysentery vaccine completely sensitized with a heated polyvalent dysentery serum. The vaccine is prepared from Shiga, Flexner, Kruse, Hiss, and Russell strains in equal proportions. In all some 150 inoculations were carried out among individuals kept under close observation for some fourteen days; 60 per cent. of these were actually engaged in heavy manual labour, which they carried on during the period of observation.

For the purposes of comparative observations and controls a small series of inoculations were carried out among hospital patients, who volunteered, with varying doses of untreated dysentery vaccine, both alone and mixed with typhoid + paratyphoid vaccine.

CONCLUSIONS.

1. Inoculations with untreated dysentery vaccine, either alone or combined with a typhoid + paratyphoid vaccine is not under any circumstances justified, owing to the severity and duration of the local reaction.

2. Complete sensitization of dysentery vaccine produces marked reduction in local reaction, and general reaction is very exceptional.

3. The use of a typhoid + paratyphoid vaccine, combined with sensitized dysentery vaccine, is a practical proposition from a military point of view, and can be employed in doses sufficiently large to produce a satisfactory immunity, while the local reaction is practically in all cases slight. Such a vaccine should contain in 1 c.cm. *B. typhosus*, *B. paratyphosus* A, and *B. paratyphosus* B 500 million in a ratio of 2, 1, 1 *plus B. dysenteriae* (sensitized) 250 million. A dose of 1 c.cm. is recommended as a first inoculation, followed by a second inoculation of the same amount after an interval of seven or eight days. A third inoculation may be made, but is not essential. It is important that the inoculations should be made in subcutaneous tissue over muscle. In our experience the pectoral region is convenient. In order to ensure accurate doses, a 1 c.cm. syringe with a moderately fine needle should be used.

4. *Agglutination Reactions.*—After one inoculation of a combined untreated vaccine specific agglutinins are found in the blood after an interval of nine to fourteen days for each of the four organisms present. Immunity is therefore rapidly produced, and it would appear that complete sensitization of the dysentery organisms not only reduces the local reaction, but produces a much more rapid and satisfactory immunization, owing to the more complete disintegration of the treated organisms and the absence of any mechanical obstruction (such as localized fibrosis) to the blood supply of the affected area.

5. We anticipate that even a further reduction in local reaction will be obtained on the employment of a mixed vaccine prepared from typhoid, paratyphoid A, paratyphoid B, and dysentery organisms, completely sensitized with their respective antiserums.

We propose shortly to publish full details of our observations in regard to the use of this vaccine.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

STRANGE WOUNDS CAUSED BY HIGH EXPLOSIVES.

ABOUT twenty years ago three men were concerned in a nitroglycerine explosion, and two of them lost their lives and one—less hurt—his reason.

They were sitting by the fireside in a small cabin, "having a smoke" after breakfast. One of the number was also busy trying to readjust the composition of some dynamite which he had been tempering on the hob in an old salmon tin. Becoming heated too much, the nitroglycerine separated from the earthy matter and formed a jelly-like lining on the inside of the tin, and this the unfortunate man—who described his action fully and confidentially to the writer just before he died—was endeavouring to scrape off with his pocket knife.

A terrible explosion occurred, and two of the men presented extraordinary wounds, especially on the thighs, and in only one wound (a chest one) was any trace of metal found. In the thighs and trunk the chief feature was a small external wound leading into a large cavity churned up and softened. One unfortunate man had both eyes quite burst up, as if a rough attempt had been made to gouge them out.

The oldest man, who, it seems, was furthest away and thus less injured, was quite mentally upset, and not able, when he recovered consciousness, to give any particulars of the accident. His mind was such a blank that it was thought that he was malingering, in order, being a foreman, to escape responsibility.

At the time I came to the conclusion that the strange wounds were caused by the escape of internal body pressure into the vacuum produced by the explosion, the particular situation being determined by certain spots in the integument being accidentally punctured and a funnel-shaped cavity produced. There was very little damage to clothing and practically no burning.

Tuberculosis Institute, Newport, Mon. J. LEWIS THOMAS, M.D.

THE VALUE OF ANTITETANIC SERUM.

CAPTAIN KILNER'S paper in the JOURNAL of January 8th on a severe case of tetanus successfully treated by antitoxin is very interesting, and I have no doubt that at the end of the war there will be a full report of cases of tetanus treated by serums, as also cases of lacerated wounds in which prophylactic doses of serum have been given.

In the BRITISH MEDICAL JOURNAL for December 24th, 1910, I published two cases of acute tetanus in which antitetanic serum was used and the patients recovered. In cases of lacerated wounds prophylactic doses were recommended to be given as soon as possible.

Since 1910 other two cases have come under observation and recovered with the serum treatment. The serum was injected into the soft part of the hip every twelve hours until the symptoms improved and then every twenty-four hours until recovery was complete.

Both in hospital and private practice prophylactic doses of serum have been used with the best effect. Even in comparatively slight lacerated wounds where contamination with earth or dirt of any kind was possible, in addition to thorough cleansing, the prophylactic dose of serum was invariably given.

Microscopic examination of discharges from wounds is essential, but no delay must take place in giving the serum, as it is important to anticipate the absorption of the bacillus. In the cases of acute tetanus which came under my care Professor Muir found the bacillus; on the other hand, its absence does not justify withholding the serum if the symptoms and local conditions indicate that it is necessary.

Edinburgh. J. CRAWFORD RENTON, M.D.Edin., Lieut.-Col. R.A.M.C.(T.).

TWO CASES OF STONE IN THE PROSTATE.

CASE I.—A. B., aged 78, came to me in June, 1913, complaining of stricture. With difficulty I got the smallest filiform catheter into the bladder. On rectal examination a very hard, fixed, but even mass was felt at the site of the prostate. The condition was, therefore, calculus or malignant disease. To decide the point quickly I passed a needle through the perineum; it struck a calculus. In company with Drs. Browne and Scott I opened the bladder suprapubically, and removed many stones (earthy phosphates) from a cavity which now was the only relic of the prostate left. I then cut the stricture. He made an excellent recovery.

CASE II.—In April, 1914, I operated on C. D., aged 76, assisted by Dr. Duncan of Richmond. The history was that on two other occasions stones had been removed suprapubically. Years ago I removed both testes for disorganizing suppuration. We removed the stones through the perineum, having slowly dilated the membranous urethra by the finger. The whole bladder, and especially its neck, where some of the stones lay, was encrusted with phosphates impossible to remove save by a curette. I therefore curetted them off, paying special attention to the cavity in the prostate. He made a good recovery.

There were some points of interest and importance in these cases.

1. A. B. had a severe rigor, and collapsed before he gained consciousness, and had rigors (and subsequent fever) each time, and immediately I douched his urethra, and more markedly when this canal was distended, even in its anterior part. He had therefore reflex urethral fever, in contradistinction to infective urethral fever (terms which should be used).

2. The simple and inexpensive means of making a diagnosis between calculus and malignant disease.

3. C. D. suffered for some years after the orchidectomy, just as a woman suffers after the menopause, and at his age (76) this is interesting. He had frequent flushings and sweatings, strange feelings in his head, irritability, etc. These were partially relieved by orchitic extract.

4. C. D. was also left with some degree of urinary incontinence. This might, I think, have been avoided had I adopted, as I did in other cases, gradual instrumental dilatation of the wound before the introduction of the finger. This applies also to perineal prostatectomy, provided the organ is removed through the wound in pieces.

London, E.C. JAMES MACMUNN.

Reports

ON

MEDICAL AND SURGICAL PRACTICE IN HOSPITALS AND ASYLUMS.

FULHAM MILITARY HOSPITAL.

THE medical staff of this hospital has instituted fortnightly meetings for the discussion of cases. At the third meeting, on December 21st, 1915, Major PARSONS, O.C., being in the chair, Lieutenant CUMMINGS showed a case of aneurysm of the arch of the aorta, due apparently to violent concussion by an exploding shell, the symptoms developing immediately afterwards, and there being no history of syphilis. He also showed a case of auricular flutter supervening on the stress of military service, but giving a suggestive history of several attacks of sudden unconsciousness previous to enlistment; and a case of pericarditis and aortic valvular disease, with enormous enlargement of the heart, in which great improvement had followed the use of thyroid gland medication. The signs of hypothyroidism were very slight, but of the usual character.

Mr. CHAPPLE showed two cases of spiral fracture in the

lower third of the tibia, with marked eversion of the foot after union; in one, subsequent replacement of the bone and plating had resulted in a good position and a useful foot. He advocated operation in every case possible, but in septic compound fractures it was necessary to wait for long after the wound was completely healed before attempting any surgical interference.

Dr. GAY showed a patient giving a history of attacks of vertigo, vomiting, and abdominal pain, extending over four years; since admission he had developed nystagmus and a tendency to fall backwards. The vertigo was of the intracerebellar type—that is, he had a sense of rotation, external objects appearing to move in the same direction. The abdominal reflexes were diminished. Dr. Nourse, otologist to the hospital, had pronounced against labyrinthine disease. In a very illuminating review of the case Dr. KINNIER WILSON, neurologist to the hospital, gave grounds for the belief that no one lesion would explain both the nystagmus and the diminution in the abdominal reflexes, and stated his opinion that the case was probably one of early insular sclerosis.

British Medical Association.

CLINICAL AND SCIENTIFIC PROCEEDINGS.

STAFFORDSHIRE BRANCH.

THE first general meeting of the session was held at Stoke-on-Trent on November 18th, 1915, when the President, Dr. F. M. ROWLAND, was in the chair. Dr. MITCHELL SMITH read a paper on *Alimentary hygiene in children* in which he pointed out that the two chief causes of infantile mortality were (1) insufficient care of the mother in the prenatal life of the child, (2) artificial feeding. He briefly described pyloric spasm and stenosis, the routine treatment of epidemic diarrhœa at the Evelina Clinic, advocated examination under an anæsthetic in suspected cases of abdominal tuberculosis in children, and drastic restriction of milk fluids and carbohydrates in the treatment of these early cases. After referring to the frequency with which stomach cough is mistaken for pulmonary tuberculosis in children, he concluded by emphasizing the importance of schemes for children's welfare at the present time and stated that the country was under a debt of gratitude to those who were inaugurating classes and demonstrations to teach the young mother her duty towards her offspring.

In a paper on *Nose bleeding*, Mr. G. A. CARTER urged the necessity of conducting all examinations of the nose with the aid of proper illumination and a speculum, and showed a small portable dry-cell battery and head-light which he found of great use. The post-nasal use of plugs was condemned as obsolete, and the dangers attending the use of any kind of packing in the nose were discussed. The value of hydrogen peroxide as a haemostatic in nasal cases was urged, and all styptic drugs, such as perchloride of iron, condemned as dangerous.

Messrs. S. MCMURRAY and E. E. YOUNG presented a paper on a *Case of intracranial new growth simulating miner's nystagmus.*

J. D., aged 36. Previous history unimportant. In February, 1911, a stone struck his left eye, causing a traumatic cataract. After treatment he worked for six months as a timberer, but had to stop on account of pain in his injured eye. When examined in February, 1913, he was suffering from miner's nystagmus, rotatory in type. Right vision (with glasses) = $\frac{6}{12}$; fundus normal. Left eye, aphakia—divergent strabismus; fundus normal. Examined again in June, 1915. He had not worked down the pit since February, 1913. Complained of severe frontal headaches; blurred vision. Right vision = $\frac{6}{4}$; faint jerky irregular nystagmus on looking up; fundus normal.

On August 20th, 1915, he complained of severe frontal headaches for past six days; no sickness, giddy. Right vision = $\frac{6}{60}$. Right disc was swollen 2 D., field contracted. Wassermann reaction positive.

August 26th, 1915. Decompression.

September 16th, 1915. Right vision = $\frac{6}{12}$; fundus normal.

The authors considered the case interesting in that the symptoms of miner's nystagmus apparently returned, and that until papilloedema developed there was no reason to suspect intracranial new growth.

Reviews.

FIBROSITIS.

THE authors of this encyclopaedic work on *Fibrositis*,[1] or inflammation of some portion of the white fibrous tissue of the body, are to be congratulated upon the thoroughness with which they have executed their task. Their task has been to extract and characterize one class of cases from the clinical *omnium gatherum* known as "chronic rheumatism." As everybody knows, "rheumatism" is a term that has been so widely and so loosely used as to have lost all definite meaning—except, indeed, to the actual sufferer. Clinically, the word "rheumatism" has been more abused and misapplied in the description of all chronic painful affections than even "influenza" has in the diagnosis of acute infections of unknown etiology. Drs. LLEWELLYN and JONES argue that the term "chronic rheumatism" contains three entities at the present time, namely: (1) Chronic articular rheumatism, (2) muscular rheumatism, and (3) neuralgic rheumatism, each containing subvarieties that may be classed as infective, toxic, traumatic, static, and so forth. They propose to restrict the name "chronic rheumatism" to the chronic cases of infective arthritis in which the causal microbe has not yet been identified. "Fibrositis" is the term to be given to all cases in which the pathological lesion is an inflammation (whether infective or toxic) of the white fibrous tissue of the body—a conception that is far from novel, for it was entertained by Craigie early in the nineteenth century. Either joints, nerves, or muscles may be the apparent seat of this fibrositis. Further explaining the arrangement of their subject matter, the authors divide it into three main portions, namely: (1) Infective or toxic fibrositis, (2) traumatic fibrositis, and (3) villous synovitis of the hip and knee, and sacro-iliac relaxation. The first of these groups again has three subdivisions—articular fibrositis or chronic articular rheumatism, myofibrositis or muscular rheumatism, and neurofibrositis or neuralgic rheumatism. The second group also has three subdivisions; these are subacute rheumatic synovitis, "rheumatic" bursitis, and traumatic muscular fibrositis. Thus it appears that they would throw out the popular term "chronic rheumatism" altogether, substituting for it the name "fibrositis," with its aforementioned subdivisions. Their classification, therefore, takes no account of the diverse causal factors of fibrositis, but rests solely upon the anatomical pathology of its various forms.

The experience of Dr. Llewellyn at Bath, of which he has clearly taken the fullest advantage, enables him to write of the manifold varieties of fibrositis with a first-hand knowledge that few physicians could hope to rival. He tabulates 1,250 cases of fibrositis, for example, in his statistics, 543 of sciatica, and so throughout his series of fibrositic forms. The forty-five chapters of the book deal faithfully with these forms and with their description, etiology, cause, course, and treatment. The photographic illustrations and plates are excellent, and do much to help the text. The text itself is clearly written and full of interesting and original observations. The subject is one that has engaged the casual pens of a host of medical writers. The appearance of so full and authoritative an account of what the public will for many years, no doubt, continue to call "rheumatism," "gout," or "rheumatic gout" indifferently, is a most welcome event for medical men. The book should be widely read, not only for the good sense and novelty of its contents, but also because it contains a mine of information on the cause, diagnosis, and treatment of a group of painful affections so common as to be commonplace—and therefore perhaps unduly neglected—in general medical practice.

PHYSIOLOGY AND HISTOLOGY.

THE first edition of HUXLEY'S popular *Lessons in Elementary Physiology*[2] was published in 1866; the book was ultimately revised and almost rewritten by Michael

[1] *Fibrositis (Gouty, Infective, Traumatic, so-called Chronic Rheumatism, including Villous Synovitis of Knee and Hip, and Sacro-Iliac Relaxation.* By Ll Jones Llewellyn, M.B.Lond., and A. Bassett Jones, M.B.Lond. London: W. Heinemann. 1915. (Sup. roy. 8vo, pp. 728; 6 plates; 136 figures. 25s. net.)

[2] *Lessons in Elementary Physiology.* By T. H. Huxley, LL.D., F.R.S. Enlarged and revised edition (6th). London: Macmillan and Co. 1915. (Fcap. 8vo, pp. 619; 185 figures. 4s. 6d.)

Foster. Now Mr. Barcroft restores the work of these men from the dilapidations made by two decades of scientific progress. He has faithfully left untouched any portion of the fabric in which there was not an actual flaw, but where the structure needed repair he has made it thorough, substantial and simple. The results of his handiwork are certain to maintain the long continued popularity of this work, and carry on Huxley's name to yet another generation of students. The textbooks of physiology written for medical students, as all the other tomes on anatomy, medicine, and surgery, have grown to such proportions that they crush his spirit and weigh down his intellect. Mr. Barcroft in the "new Huxley" has given us a book on physiology of the right scope and size not for the public, but for the ordinary medical student. We hope that those students, now destined to be combatants, who live through the war, will on returning to their studies find a less absurd system of education, for the world will want medical men and will be impatient of academic folly. On the subject of ventilation we note that Mr. Barcroft authoritatively states that the air of crowded ill-ventilated rooms contains poisonous exhalations and produces its ill effects through these. He seems to be unaware that the scientific proof of the existence of such poisons has wholly broken down, as evidenced by the researches of first-class workers in Europe and America; the real causes of discomfort and ill health—stagnation, excessive moisture and heat of the atmosphere—are not even mentioned. This is a regrettable defect in a book designed for popular guidance.

Professor FREDERIC T. LEWIS has brought out the second edition of a *Textbook of Histology*,[3] an enlarged and improved version of Stöhr's book, arranged upon an embryological basis. The account given of the subject is good and full; it is illustrated by 495 figures, which deserve the highest praise for their truth to structural detail and artistic merit. There is a section on drawing at the end of the chapter on microscopical technique, and Professor Lewis recalls therein the fact that the works of Vesalius were illustrated by Jean de Calcar, a pupil of Titian. He cites Robert Hooke, who said: "I endeavoured first to discover the true appearance, and next to make a plain representation of it," and Ruskin, who held that "the real refinement of the outline depends on its truly following the contours." How difficult it is to analyse the truth so as to express it, is shown by the drawings appended of the medullary tube by six students. In the description of the testis the author gives an account of the discovery of the spermatozoa. They were first seen by Dr. Ham, "a man of singular modesty," to whom Leeuwenhoek gives full credit for the discovery in his letters to the Royal Society. "This discerning youth," he says, "visited me, and brought with him in a small vial seminal fluid from a man who had cohabitated with a diseased woman; and he stated that after some minutes, when the fluid had become so attenuate that it could be put in a slender glass tube, he had seen living animalcules in it . . . which seemed to him to be provided with tails." Dalenpatius thought that the new individual was enclosed in the spermatozoön, like an insect in its chrysalis. "For while we were observing them attentively a large one threw off its surrounding membrane and appeared naked, showing distinctly the legs, thighs, breasts, and arms. The cast-off skin drawn upward covered the head like a cap, and it was a delightful and incredible sight." This is a gross presentation of the doctrine of preformation of which Sterne made such humorous use in the opening chapter of *Tristram Shandy*. The alternative theory of epigenesis ascribed the origin of the body out of formless substance. Descartes said the new individual "seems to be only a confused mixture of liquors which, serving to leaven one another, become heated; some of their agitated particles dilate and press upon the others, gradually dispersing them in the way necessary to form organs." The careful choice of such interesting matter makes the study of histology far more attractive and of much higher educational value.

[3] *A Textbook of Histology arranged upon an Embryological Basis.* By Dr. F. T. Lewis and Dr. P. Stöhr. Second edition, being the Seventh American edition of Stöhr's Histology. From the Fifteenth German edition. Edited by Dr. O. Schultze. Philadelphia: P. Blakiston's Son and Co. 1913. (Roy. 8vo, pp. 550; 495 figures.)

TREATMENT OF FRACTURES.

THE fact that *The Treatment of Fractures*, by Dr. C. L. SCUDDER,[4] has reached its eighth edition in the space of fifteen years, gives some indication of its popularity. It may fairly be said that no pains have been spared in its production; it contains a most beautiful collection of photographs and skiagrams illustrating not only fractures of the various bones, but in nearly every case plates are given of the most suitable form of splint and its application.

To the British reader a certain number of the methods of treatment are unfamiliar, and he will probably regret to miss, for example, Carr's splint in the description of the treatment of Colles's fracture, but this dissimilarity is no real disadvantage, as it helps to a broader outlook. The author is evidently no great enthusiast for the open treatment of fractures. Most will agree with him when he states that operative treatment should never be undertaken lightly, and should only be resorted to when there are clear indications that the older forms of treatment are not likely to give good results.

Certain sections of the book are especially worthy of mention. There is a most useful article on fractures of the jaw, showing how these difficult cases may be dealt with by wiring and by other methods. Matas's splint, which we have not seen in use in this country, is described and figured. It would seem to be a useful contrivance. It consists of a clamp, one arm holding a mouthpiece which fits the lower jaw, the other a cup which is applied under the chin. When in position, these two arms project directly forward outside the mouth, and are fastened together by a screw. Many fractures of the jaw fall more within the province of the dentist, with his special skill in taking casts and making interdental splints, but Dr. Scudder's observations will be useful to those who have to treat cases of compound fracture of the jaw among the wounded. There are interesting articles on gunshot wounds of bones and the making and application of the various forms of plaster splints. Into the description of the latter a series of photographs is introduced showing every step in the production and application of these splints. The author has devoted considerable attention to the prognosis of the various forms of fracture. In every case a statement is made as to the average length of time in which consolidation may be expected and function regained. The notes should prove of great practical value to the practitioner. In conclusion, it may be said that the book is a most comprehensive account of the subject, and can be most strongly recommended.

CAN LIFE BE EXPLAINED?

DR. R. E. LLOYD is inclined to the opinion that there is a growing number of thoughtful persons whose minds do not regard life as a problem requiring or capable of any final solution. His book, '*What is Adaptation?*[5] was written, he tells us, mainly to determine the direction of opinion on this point. He regards what may be called the teleological enterprise as an outcome of the mechanistic view—that view which regards the universe in general and living organisms in particular as things made, analogous to those of which we ourselves are the makers. This view led first naturally and inevitably to the theological explanation, of which Paley's comparison of man to a watch and the Deity to its maker is a familiar example. When that explanation had ceased to give satisfaction, Darwin suggested natural selection as an alternative. It is a great point with Dr. Lloyd that the selection theory is an attempt to account for adaptation on mechanical lines, but for all that an outcome of the same teleological attitude towards life which produced the theological explanation. For it regards adaptation as a problem assumed to be capable of solution, also as a quality of variable degree, which Dr. Lloyd questions. He thinks that we regard adaptation as a problem only because man does not realize himself as a part of nature and life, so that when he discovers in organisms the same purposive attributes of which he is conscious in his own handiwork

[4] *The Treatment of Fractures, with Notes upon a Few Common Dislocations.* By C. L. Scudder, M.D. Eighth edition, revised. Philadelphia and London: W. B. Saunders Co. 1915. (Roy. 8vo, pp. 734; 1,057 figures. 25s net.)

[5] *What is Adaptation?* By R. E. Lloyd, M.B., D.Sc.Lond., Major, Indian Medical Service. London: Longmans, Green, and Co. 1914. (Med. 8vo, pp. 122. 2s. 6d.)

he puts to himself the question: "How is it that life can produce the same kind of results that I myself can produce?" From the author's point of view, which is vitalistic and Bergsonian, "purpose is not a human attribute present in life, but a vital attribute present in man." Once we realize purposive adaptation as an essential and inalienable attribute of life in all forms we shall, the author thinks, cease to wonder at the resemblance between organisms and mechanisms and to regard it as a problem. We shall content ourselves with the endeavour to know more and more about life, but we shall not expect or even desire to explain it. "The problem of life is to know how it is, not how it was made; not to seek for an explanation of it, but to go on explaining it." Dr. Lloyd holds that we are aware of a something beyond the sphere of sense and reason which he calls "supernature," but deprecates the supposition that this something can ever be clearly imagined or understood. His book is well worth reading.

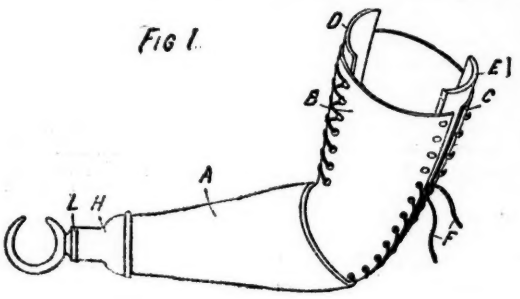
NOTES ON BOOKS.

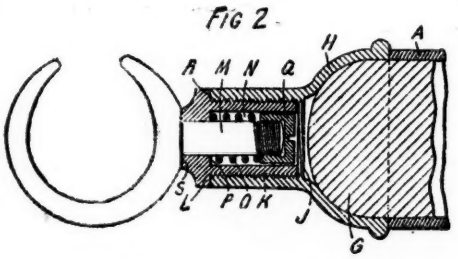
THE dependence of the modern treatment of lunacy upon Harvey's great discovery is not very easy to establish, but in his Harveian Oration[8] Dr. COUPLAND contrived with some skill to pass from the one to the other, and what he says about insanity is marked by restraint and good sense. He is no fanatical advocate of the universal causation of insanity by drink. It is true that of first attacks of insanity 26.3 in the male and 10.4 in the female occur in persons addicted to drink, but he very properly points out what is usually forgotten—that these figures are of no value unless they are controlled by an analogous census of drinkers who do not become insane. It is rather astonishing to hear from Dr. Coupland that no fewer than one-fifth of the total admissions into public asylums, amounting in all to 20,000 in each year, are known to have suicidal propensities, and it is extraordinary that, although more than 4,000 persons known to be suicidally inclined are admitted in each year, yet only fourteen in each year succeed in carrying out their intention. How much vigilance, care, and anxiety on the part of asylum officials these figures indicate it is difficult to estimate. Dr. Coupland reviews recent legislative proposals for treating insane persons without certifying them, and shows without difficulty that the "stigma" of certification is wrongly placed. The real "stigma" is upon the insanity.

MEDICAL AND SURGICAL APPLIANCES.

An Artificial Arm.

AT a recent meeting of the Swansea Division of the British Medical Association, Dr. W. L. Griffiths, surgeon to the Swansea General and Eye Hospital, demonstrated an artificial limb for cases in which the arm has been amputated below the elbow. It was, he said, the invention of Mr. Thomas Williams of Dunvant, who forty years ago had undergone amputation of the right forearm four inches below the tip of the olecranon process, but had since been able to earn his living as a collier, as a mechanic, and in other ways. The construction of the limb is illustrated in the diagram, which is taken from the patent specification. The forearm, A, is made in one piece of stout or stiff leather, and the casing for the upper arm is formed in two pieces, B, C, of soft or pliable leather attached to the forearm. These pieces are eyeletted and laced together so as to clasp the upper arm, soft tongues, D, E, being provided under the laces, F, if desired. This arrangement, besides giving more comfort, renders it possible in most cases for the wearer to attach the appliance in position without assistance. Within the wrist of the forearm casing is a block (G, Fig. 2) of wood or other suitable material, over the outer part of which is firmly fitted and secured a dome-shaped metal cap or holder, H, having a central hole or socket, J, screw-threaded internally. A correspondingly threaded plug, K, provided with an outer flange, L, is adapted to screw into this socket. This plug is centrally bored so that the shank, M, of the C-shaped hook can freely pass therethrough. The part of the bore nearest to the arm has an enlarged part, N, similar to a stuffing box, to receive a spring, O, which is coiled around the end of the shank when placed therein. This spring is compressed between abutments formed by the shoulder, P, in the plug, and a nut or cap, Q, which is screwed on to the end of the shank, and is small enough to enter the space N. The plug, K, is then screwed into the socket, J, until the flange, L, meets its seating, R, and the appliance is ready for use. The hook, with its shank, M, is free to revolve axially in the plug, K, after the latter is screwed home, but is prevented from doing so too freely owing to the friction on the ends of the spring and between the base of the hook and its abutment, S. When a sudden pull comes upon the hook, the spring is further compressed and lessens the jar. Dr. Griffiths said that the chief points of interest were the shape and action of the hook, and the mode of attachment to the stump. The hook was convenient for using tools, for lifting and for pushing. The attachment of the artificial limb by means of soft leather flaps laced round the upper arm taking their grip above





the condyles of the humerus, allowed free movement of the elbow-joint. The experience of the inventor, who had been using the arm for forty years, showed that there was no risk of pressure sores; the skin was freely movable over the deeper tissues, and it was not appreciably thickened. Mr. Williams could use a pick and shovel, could lift a weight of 56 lb., could swing a 14 lb. sledge hammer, could use a scythe, could plough, could pitch hay, and do any other work of an agricultural labourer, and could work as a collier, a mechanic, and a carpenter. Dr. Griffiths expressed the opinion, in which members present concurred, that it was the best artificial arm yet designed for a case in which the forearm has been amputated below the elbow.

THE MILITARY MEDICAL SERVICES IN 1915.

IN the BRITISH MEDICAL JOURNAL of January 2nd, 1915, was published an article on the military medical services in 1914, with special reference to the first five months of war, and the work and losses of these services under arms. The present article continues the history of these services during twelve months of war in 1915.

THE ARMY.

Last year's note included two tables, giving the strength of the R.A.M.C. in January and in December, 1914, respectively, showing the great expansion of the R.A.M.C. to meet the needs of war. The strength of that service had increased between July and December, chiefly by the employment of temporary officers, by about two-fifths, or roughly, including Territorials and Reserve medical officers, from somewhat over 3,000 to a good deal over 5,000.

These two tables are now reproduced (slightly corrected), along with a third, six months later, compiled from the monthly *Army List* of June, 1915, the last available to the

[8] *The Harveian Oration, 1915.* By Sydney Coupland, M.D. London: Cassell and Co. 1915.

general public, which shows a much greater expansion, after nearly a year of war, to well over 7,000.

Strength of the R.A.M.C.

	January, 1914.	December, 1914.	June, 1915.
R.A.M.C. Regulars.			
Surgeon-Generals ...	12	12	20
Colonels	29	35	99
Lieut.-Colonels	130	151	254
Majors	332	381	245
Captains	422	399	488
Lieutenants	129	121	1
Total	1,054	1,099	1,107
Retired Officers employed	65	102	149
Special Reserve.			
Lieut.-Colonels	—	1	1
Majors	15	10	9
Captains	26	60	73
Lieutenants	143	590	626
Total	184	661	709
Temporary Officers.			
Colonels	—	7	14
Lieut.-Colonels	—	7	33
Majors	—	10	51
Captains	—	41	122
Lieutenants	—	1,073	2,477
Total	—	1,138	2,697
Territorials, all Ranks.			
Regimental	567	640	703
Field ambulances ...	363	609	808
General hospitals ...	663	745	848
Sanitary service	116	119	169
Clearing hospitals ...	—	31	93
Total	1,709	2,144	2,621

These figures cannot be considered absolutely accurate, but will be found correct within a few units in each case. There is a certain amount of overlapping. In some cases an officer's name appears twice over, in different places.

Summary.

	January, 1914.	December, 1914.	June, 1915.
R.A.M.C.			
Regulars	1,054	1,099	1,107
Retired officers	65	102	149
Special Reserve	184	661	709
Temporary officers ...	—	1,138	2,697
Territorials	1,709	2,144	2,621
Total	3,012	5,144	7,283

It will be seen that, though there had been no new admissions to the R.A.M.C. between December, 1914, and June, 1915, while many casualties have occurred, the numbers have not fallen but have slightly increased. This is due to the absorption into the active list of a number of retired officers from the reserve. The one lieutenant shown in June, 1915, is a reserve officer. Senior officers who have attained the age for compulsory retirement, and those who have completed the regular tour of service in the administrative ranks, have also been retained on the active list. The numerous recent promotions from the rank of lieutenant to that of captain, among the temporary officers and those of the Special Reserve, were still shown as lieutenants in June.

The June *Army List* also shows 114 medical officers in the Canadian forces and three in the Newfoundland contingent. The details of the Australian and New Zealand forces are not given.

Though the *Army Lists* of a later date than June, 1915, are not available for comparison, we can refer to an official statement of strength in November, which must be at least approximately accurate up to that date. On November 9th Mr. Tennant, Under Secretary of State for War, stated in the House of Commons that the strength of the R.A.M.C. up to that date, including regulars, retired officers re-employed, Special Reserve, temporary officers, and Territorials, was 9,626, of whom 2,474 were Territorials. (In a similar statement made in the House on May 19th the number of Territorials was given as 2,122, and the total number as 7,027.)

It must be noted that the figures given above—9,626 medical officers—do not appear to include the medical department of the Canadian, New Zealand, and Australian forces—say perhaps 400 in all—or the Indian Medical Service—nearly a thousand. To these may also be added the strength of the medical department of the navy—say 1,000—making a total of, roughly, some 12,000 medical officers employed in the different fighting services.

Since November 9th a further considerable number of temporary lieutenants have been gazetted to the R.A.M.C., while a few have resigned their commissions. These changes have probably brought up the total number of officers in the various branches of the R.A.M.C. to over 10,000 by the end of the year. Many of the Canadian medical officers have also been gazetted temporarily to the R.A.M.C. On the other hand, the number of Territorial medical officers shown in the June *Army List* (2,621) is larger than the figure given for November 9th (2,474).

Not all of these medical officers are giving full-time service. The Regulars, Special Reserve, and temporary officers are of course doing so. So are all the Territorial medical officers serving with regiments, with field ambulances, and with clearing stations. In the Territorial general hospitals, however, as a rule, only the commanding officer and registrar are whole-time officers; the majority of the staff are giving part-time service only. Many individuals have been seconded for service abroad, and thus are giving their whole time; but such officers have presumably been replaced and struck off the strength of their own hospitals. On the other hand, a number of medical men are serving under the British Red Cross, chiefly in hospitals at home and abroad; and while some of them hold temporary commissions, and so are included in the statistics given above, the majority are not so commissioned.

KILLED OR DIED OF WOUNDS OR DISEASE.

The number of medical officers killed in action, including those who died of wounds or went down with the ships on which they were serving, in 1914, during five months of war, was 46. Of these, 27 belonged to the R.A.M.C. (Regulars 21, Special Reserve 1, Territorials 1, and temporary officers 4), 13 to the navy (active list 9, reserve 2, R.N.V.R. 1, and 1 temporary), 2 to the I.M.S., 1 to the West African Medical Staff, and 1 to the Australian force in New Guinea, while 2 were serving as combatants. The two last, of course, though medical men, were not medical officers.

In 1915 the number killed is, as might be expected, much larger, totalling over 100. No fewer than 15 fell in the advance on September 25th and subsequent days and the ensuing German counter-attacks. The chief incidence of loss in the past year, however, has fallen, not on the Regulars, but on the Territorials and the temporary officers. The figures are as follows:

Royal Navy (active list 9, R.N.V.R. 2, temporary 3) ...	14
R.A.M.C. (Regulars 8, Special Reserve 6, Territorials 12, temporary 36)	62
Colonial Forces (Canada 2, Australia 5, New Zealand 1) ...	8
Indian Medical Service	5
Colonial Services	5
Mercantile Marine	3
Combatants	12

In addition to those actually killed, 21 have died of disease or by accident while serving abroad, or very soon after being invalided home, making a total roll of honour of considerably over 120.

The names of those killed are as follows. It is possible that one or two names may have been omitted. If so, we shall be glad to receive information.

R.A.M.C., Regulars.

In France and Flanders: Colonel E. O. Wight; Major F. G. Richards; Captains H. V. B. Byatt, J. F. Gwynne, and E. C. Deane; and Lieutenant P. M. J. Power.

In the Dardanelles: Colonel N. Manders.

In Mesopotamia: Captain M. Burnett.

R.A.M.C., Special Reserve.

In France and Flanders: Captains H C. Storrie and S. F. M. Cesari; Lieutenants W. T. McCurry, G. M. Chapman, E. Faulks, and R. Montgomery.

R.A.M.C.(T.F.).

In France: Captain E. L. Giblin.

In the Dardanelles: Lieutenant-Colonel W B. Pritchard; Majors J. C. Taylor and D. R. Taylor; Captains A. Kellas and W. R. Roberts; and Lieutenants P. T. Warren and A. B. Thompson; also four lost in the transport *Royal Edward* in the Aegean Sea; Lieutenant-Colonel J H Dauber, Major J. Mowat, Captain C. B. Marshall, and Lieutenant T. Hayhurst.

R.A.M.C., Temporary.

In France and Flanders: Captains J. N. Armstrong, A. E. Bullock, E. W. Carrington, T. H. S. Bell, G. L. Grant A. G. Miller, and J. H. Meers; Lieutenants D. Campbell, D. C. Turnbull, J. R. Waddy, E. Stratford, H. W. Goodden, J A. MacMahon, M. Pern, G. H. Lunan, D. G. Watson, G. M. M. Fleming, G. Macallum, J. C. Hawkes, K. Robinson, C. M. Harris, E. T. Nangle, J R. Spensley, E. H. P. Brunton, T. J. Latham, M. Mackenzie, J. R. G. Garbutt, A. Hegarty, and O. G. Maginness.

In the Dardanelles: Captain A. Graham; Lieutenants J. Cattenach, T. A. Peel, J. Clarke, F. J. Wiseley, J. W. Parker, and F. H. Young (in the transport *Marquette*).

Canadians.

In France and Flanders: Major W. P. Dillon and Captain G. C. Glidden.

Australians.

In the Dardanelles: Majors S. J. Richards and F. M. Johnson; Captains G. C. Matthison, K. Levi, and G. F. J. Luther.

New Zealanders.

In the Dardanelles: Lieutenant-Colonel C. E. Thomas.

The names of those who have died on service overseas, or soon after reaching home invalided from service, are:

R.A.M.C., Regulars: Major C. E. Fleming, Glasgow; Captains A. A. Sutcliff and S. Field, both as prisoners of war at Wittenberg, in Saxony.

R.A.M.C.(T.F.): Lieutenant-Colonels G A. Edsell, Surbiton, and A. A. Ross, London; Majors A. Hilton, Egypt, and W. A. Malcolm, Malta; Captains G. W. Buxton and W. E. Rielly, Dardanelles.

R.A.M.C. (temporary): Captain J. F. Fairley, France; Lieutenants E. A. Wright, Alexandria; W. R. Pryn, France (accident); S. B. Walsh, France; E. D. Parsons, London; J. McGowan, Malta, and J. C. Bell and B. C. Letts, Alexandria.

Australians: Captain A. Verge, Alexandria.

New Zealanders: Colonel F. C. Batchelor, Dunedin; Major T. C. Savage and Captain J. A. T. Bell, Egypt.

As was the case last year, and as is naturally the case, the great majority of the officers killed were of the junior ranks. In the R.A.M.C., two full colonels and one major were killed, of the Territorials two lieutenant-colonels and three majors, one lieutenant-colonel in the New Zealand contingent, two majors in that from Australia, one major in the I.M.S., and one lieutenant-colonel and one major serving as combatants.

Sons of Medical Men.

A very large number of sons of medical men have fallen in the war, as may be seen in the pages of this JOURNAL during the past six months, during which over two hundred have been recorded. A very large number also fell during the first eleven months of the war, before the JOURNAL began to insert these notes. Many cases must have escaped notice, especially among the colonial contingents.

Medical Students.

The number of medical students recorded as killed is not so large, but in this case also, even more than in that of sons of the profession, the information available is very incomplete. During the past six months over fifty such cases have been recorded in the JOURNAL, not counting those medical students who were also sons of medical men, but including those recently reported from Trinity College, Dublin.

Medical Men and Dentists Killed or Died of Wounds whilst Serving as Combatants.

The following is a list, as complete as we have been able to make it, of medical men and dentists holding commissions as combatants who have been killed or died of wounds since the beginning of the war. The list is very possibly incomplete, and we shall be obliged if relatives of any other medical men who have been killed or died of wounds while holding commissions as combatants would communicate with us. We should also be glad to receive particulars of any medical man who may have been killed or died of wounds whilst serving as a combatant but not holding a commission. The names in the list are arranged in alphabetical order:

Medical Practitioners.

F. M. Bingham, L.R.C.P., M.R.C.S., Captain 5th King's Own Lancaster Regiment, Flanders, May 22nd, 1915.

A. C. Clifford, L.R.C.P., M.R.C.S., Second Lieutenant 3rd Dragoon Guards, Ypres, Flanders, June 1st, 1915.

A. Corley, M.D., Captain 11th Australian Infantry, Dardanelles.

S. N. Crowther, L.R.C.P., M.R.C.S., dispatch rider, Flanders, October 18th, 1914.

S. C. Huddlestone, M.B.Edin., Second Lieutenant 3rd Black Watch, France, January 25th, 1915.

B. M. Hughes, L.R.C.P., M.R.C.S., Captain 1/4th Norfolk, Dardanelles, September 15th, 1915.

H. T. Hunter, M.B.Durh., Captain 6th Northumberland Fusiliers, Ypres, Flanders, April 26th, 1915.

J. W Jessop, L.R.C.P., M.R.C.S., Lieutenant-Colonel 4th Lincoln, France, June, 1915.

T. S. Lukis, M.D.Lond., Lieutenant 13th London Regiment, France, March 15th, 1915.

W. E. Maitland, M.B.Glasg., Lieutenant 3rd Seaforth Highlanders, France, December, 1914.

E. M. Ridge, F R.C.S., Sub-Lieutenant R.N.V.R., Antwerp, October, 1914.

A. Wallace, M.B.Edin., Captain 1/4th K.O.S. Borderers, Dardanelles, July 12th, 1915.

Dentists.

J. J. Dykes, L.R.C.P. and S.Edin., L.R.F.P.S., L.D.S., Captain 1/5th K.O.S. Borderers. Dardanelles, July, 1915.

J. Morham, L.R.C.P. and S.Edin., L.R.F.P.S., L.D.S., R.C.S.Edin., Captain 4th Royal Scots (missing), Dardanelles, September, 1915.

H. B. Neely, L.D.S., 2nd Lieutenant 1st Suffolk, Ypres, Flanders, April 25th, 1915.

Wounded.

The number of medical officers whose names have appeared in the casualty lists as wounded during the year is considerably over two hundred. It is probable that the figures given are not absolutely correct, but they are approximately so. In a few cases the same officer has been more than once returned as wounded. The numbers recorded can be shown most easily and clearly in a tabular form, for all the services together.

	France and Flanders.	Dardanelles	Balkans.	Persian Gulf.	East Africa.	West Africa.	India.	Total.
R.A.M.C.	19	4	—	3	—	—	—	26
R.A.M.C.(T.F.) ...	24	25	—	—	—	—	—	49
R.A.M.C.(S.R.) ...	18	4	—	—	—	—	—	22
R.A.M.C. (temporary)	67	21	—	1	—	—	—	89
Canadians	4	—	—	—	—	—	—	4
Australians	—	7	—	—	—	—	—	7
New Zealanders ...	—	2	—	—	—	—	—	2
R.N.	—	6	—	—	—	—	—	6
I.M.S.	3	3	—	10	—	1	1	18
West African Service	—	—	—	—	—	1	—	1
Total	135	72	—	14	—	2	1	224

Honours.

A fair share of honours has fallen to the medical services during the year, chiefly to the regular R.A.M.C. The greatest honour of all—the Victoria Cross—has been bestowed on three medical officers in 1915, besides one, the late Captain Ranken (killed in action) in 1914: temporary Lieutenant (now Major) Martin-Leake; Captain Scrimger of the Canadian force, and temporary Lieutenant Maling. Major Martin-Leake had won the V.C. in South Africa, and in February, 1915, received a clasp to his Cross. Whether a clasp to the V.C. has ever been awarded before seems somewhat doubtful, but however this may be, it is certain that such a grant is a very rare honour.

Honours also can be most clearly shown in a table for all the medical services together.

	V.C.	K.C.B.	C.B.	D.S.O.	Military Cross	D.S. Cross	K.C.M.G.	C.M.G.	Foreign.	Total.
R.A.M.C.	—	1	17	27	22	—	—	20	1	88
R.A.M.C.(T.F.)	—	—	—	1	3	—	—	1	2	7
R.A.M.C.(S.R.)	—	—	—	2	9	—	—	—	—	11
R.A.M.C. (temporary)..	2	—	3	5	26	—	3	—	1	40
Canadians	1	—	1	1	1	—	—	2	—	6
Australians	—	—	1	1	—	—	—	1	—	3
New Zealanders ...	—	—	1	2	—	—	—	1	—	4
R.N.	—	—	—	3	—	2	—	—	4	9
I.M.S.	—	—	2	3	3	—	—	3	—	11
Total	3	1	25	45	64	2	3	28	8	179

The honours gazetted on January 1st, 1916, are not included in the above table.

PROMOTIONS.

On March 1st a large number of promotions were made in the regular R.A.M.C.—68 lieutenant-colonels were promoted to the rank of full colonel, 171 majors to that of lieutenant-colonel, while all the lieutenants were promoted to the rank of captain. Later, all temporary lieutenants were granted the rank of captain after one year's service, while lieutenants of the Special Reserve and Territorial Force have been granted that rank after six months' embodied service. Ten brevet promotions have also been given in the R.A.M.C. and 5 in the I.M.S.

NURSES.

The members of the nursing service are not ordinarily employed under fire, and, as far as we know, no nurse has actually been killed in this way. But 10 were lost in the transport *Marquette* in the Aegean Sea and 1 in the hospital ship *Anglia* in the Channel. These ladies have in their way lost the r lives in action just as much as if they had fallen in the firing line. Eleven others, at least, have died on service.

THE INDIAN MEDICAL SERVICE.

This service has maintained its normal strength of a little under eight hundred throughout. Early in 1915 the men who passed in July, 1914, joined the active list. An examination was held in July, 1915, at which eight candidates were accepted, and a few of the temporary lieutenants have been gazetted to the permanent list.

A large addition has, however, been made by the employment of temporary lieutenants, chiefly Indian qualified men, and of retired officers re-employed. It may be remarked that while only five retired I.M.S. officers are shown as employed in the *Army List* of January, 1915, there were actually nearly fifty such officers serving before the end of 1914.

The following table shows the strength of the I.M.S.:

	January, 1914	January, 1915.	June, 1915.
Active list	770	782	785
Temporary officers ...	—	5	62
Retired officers re-employed	—	5	49
Total	770	792	896

Since June the number of temporary officers has increased to 130. There are also some thirty retired officers, re-employed in India, all or most of them in civil appointments, who are not included in the above table.

The temporary officers appointed include one major and four captains; the rest are all lieutenants. Among them are two officers who had resigned the service in their first few years, and who have now temporarily rejoined. A third officer, who had likewise resigned, has been reappointed on the permanent list. The temporary major is an officer who had served for nearly thirty years in the Indian army, and had retired after the usual period of command of a regiment. After retirement he took up the study of medicine, and qualified shortly before the war.

In normal times the number of officers of the I.M.S. in civil employ is nearly 500, while nearly 300 are ordinarily on military duty. The civil branch of the I.M.S. has always been looked on as a reserve for the army in time of stress, and fully one half of the officers usually in civil employ have been on military duty during the year. Members of the I.M.S. have been on active service, during 1915, in France and Flanders, in the Dardanelles, Egypt, the Persian Gulf, East Africa, West Africa, and on the Indian frontier. A number have also been employed in base hospitals in the south of England and in hospital ships. Some of the Indian base hospitals in England have recently been closed; the others will also be closed before long, as it is reported that most of the Indian troops have left France for the East.

Two members of the I.M.S. were killed in action in 1914—Major P. P. Atal and Captain K. I. Singh. Five more have fallen in 1915—Major J. Woods and Lieutenant J. P. Walsh in Flanders, Captain M. F. Reaney in the Dardanelles, Captain F. S. Smith and Lieutenant M. B. Patel in the battle of Ctesiphon, in Mesopotamia. Lieutenant Patel has been the first of the temporary officers of the I.M.S. to fall, also the first Parsi, though the third Indian-born member of the I.M.S. who has been killed in action. Two other officers have lost their lives on active service—Major J. O'Leary, drowned at Ismailia, and Lieutenant T. B. Paul, who died in the Persian Gulf Expedition. Two retired officers also died on duty during the year while employed in the base hospitals for Indian troops—Lieutenant-Colonel E. Lawrie at Brighton, and Lieutenant-Colonel L. F. Childe, who was serving in the Lady Hardinge Hospital at Brockenhurst.

Eighteen others have been wounded—ten in Turkish Arabia, including five in the battle of Ctesiphon, three in the Dardanelles, three in Flanders, and one each in West Africa and on the Indian Frontier.

Of war honours, the I.M.S. have received eleven—two C.B.'s, three D.S.O.'s, three Military Crosses, and three C.M.G.'s, besides five brevets.

THE COLONIAL SERVICES.

The only colonial medical service which has officially taken part in the war is the West African Medical Staff, several members of which have been serving in the Cameroons. This service lost one officer killed in 1914, in the past year one officer has been wounded. Several retired officers are now temporarily serving in the R.A.M.C.

Two members of the service—Drs. F. J. A. Baldwin and A. W. H. Grant—were also lost in the *Falaba*, torpedoed in the Irish Sea on March 28th.

Another colonial medical service, however, that of the Straits Settlements and Federated Malay States, has lost heavily, no less than three of their members having been killed in the mutiny at Singapur last February, two of them while serving with volunteer troops. These three were Dr. E. D. Whittle, Colonial Surgeon, Dr. P. N. Gerrard, Malay States Volunteer Rifles, and Lieutenant A. F. Legge, Singapur Volunteer Medical Company.

THE ROYAL NAVY.

The following table shows the strength of the medical departments of the navy for January, 1914, January, 1915, and July, 1915, as given in the *Navy Lists*, respectively. Unlike the R.A.M.C., the naval medical department has not required to expand, and has not expanded, to any very great extent during the war; the number of temporary and reserve officers is barely equal to that of the regular active list.

	January, 1914.	January, 1915.	July, 1915.
Active list:			
Surgeon-Generals	6	6	6
Deputy Surgeon-Generals ...	10	11	11
Fleet Surgeons	162	178	182
Staff Surgeons	186	171	162
Surgeons	159	158	150
	523	524	511
Temporary:			
Consultants	—	11	10
Staff Surgeons	—	—	1
Surgeons	—	289	383
	—	300	394
R.N.V.R.:			
Staff Surgeons	11	—	21
Surgeons	53	6	56
Surgeon Probationers	—	82	37
	64	88	114
Reserve	10	9	7
Total	597	921	1,026

There are also shown in the *Navy Lists* a little over 400 appointments as surgeon and agent, at small seaports round the coast. These are not whole-time posts; the duties are light and the remuneration small. They are mostly held by private practitioners; a few are filled by retired naval medical officers.

Losses.—The number of naval medical officers killed during the year is 14, as follows:

Fleet Surgeon G. Taylor, and Surgeons W. M. S. Miller and S. Hibbert, lost in H.M.S. *Formidable*, in the Channel, on January 1st.
Surgeon V. L. Matthews, lost in H.M.S. *Viknor* off the North of Ireland, about January 20th.
Staff Surgeon W. G. Moore-Anderson and Surgeon-Probationer R. O'C. Redmond, lost in H.M.S. *Clan Macnaghten*, in the North Sea, in February.
Surgeon F. W. Quirke, lost in H.M.S. *Princess Irene*, blown up at Sheerness, on May 27th.
Fleet Surgeon G. A. Forrester, killed on H.M.S. *Implacable*, April 25th, and Fleet Surgeon G. A. Waters, lost in H.M.S. *Goliath* on May 12th, both in the Dardanelles.
Surgeon T. L. G. Stewart (June 14th), Surgeon F. H. Rees (June 21st), and Surgeon F. J. Humphreys (September 5th), killed in the Dardanelles.
Staff-Surgeon A. O. Hooper and Surgeon D. W. K. Moody, killed on H.M.S. *Natal*, blown up on December 30th.
Temporary Surgeon D. R. B. Sivright, died at the Dardanelles.

Of these officers, Surgeon Hibbert and Surgeon-Probationer Redmond belonged to the R.N.V.R.; Surgeons Stewart, Humphreys, Moody, and Sivright were temporary Surgeons; the other ten were on the active list.

Wounded: Six naval medical officers have been wounded, all in the Dardanelles.

Honours granted have not been many; they may be seen in the table above.

THE MERCANTILE MARINE.

Three medical officers of the mercantile marine have lost their lives in ships torpedoed and sunk by the enemy, Drs. J. Macdermott and J. Garry in the *Lusitania* on May 7th and Dr. Everett in the *Persia* on December 30th. It would seem probable that other ships' surgeons must have perished in some of the numerous vessels sunk by submarines, but we have not noticed the names of any others recorded.

Miss E. S. Impey, M.B., a lady doctor going out to join the Dufferin Hospital for Women at Lahore, appears also to have been lost in the *Persia*.

MOTORS FOR MEDICAL MEN.

By H. MASSAC BUIST.

WAR EXPERIENCE AND NEW DESIGNS.

AT the turn of the year it is natural to take stock of the motor situation, particularly as concerns the prospects of obtaining vehicles in the future in face of the continuance of the war. As regards the British industry, it is plain that, save for releasing a limited portion of the heavy vehicle production for supply of firms concerned in war work, and for a few examples of light cars, chiefly of the assembled variety, all the resources of the factories will continue indefinitely to be fully employed on Government work.

Incidentally, the medical man will doubtless be aware that during the five months that have elapsed since last this topic was touched on in these pages a large amount of experience has been gained at the front with British-made light cars of the comparatively few well-established makes, including, notably, the Singer machines. The French also now make extensive use of light cars in the war area, running them almost invariably with open exhausts.

None of these machines is spared in the least degree, and the test is a hard one, not only of engine revolutions and reliability in the ordinary sense, but also of every part of the chassis. Much cobble or *pavé* has to be traversed in the vicinity of the towns, while in the open the roads are very much broken up. It is impossible for large numbers of vehicles to be submitted to these conditions of use for month after month without the manufacturers of them learning lessons which will ensure their being able to make light cars after the war which shall be as absolutely dependable for the medical man's daily and nightly service all the year round as middle-size cars, such as Rovers, De Dions, Swifts, and the like, have been for years.

LIGHT CAR TENDENCIES.

Turning to light-car progress in quite another direction, namely, across the Atlantic, we note in such comparatively new propositions as the Saxon machine that in the New World they are using wider axles for light cars than is the current practice in Europe, and this without appreciably increasing the weight factor. This development is likely to be followed in some degree in this country in that these wider axles are a natural corollary of the tendency that has been manifest here to lengthen light-car wheelbases. It is not only that better riding is obtained; with the wider axle there is besides the gain of enhanced lateral stability. This is of especial importance in the light car. Taken with the fact, proved by war service rendered by the British-built Singer light car, that the change-speed gear mechanism can be satisfactorily incorporated in the back axle details, even as for years past has been done in some of the middle-size and large cars, such as the Overland, it will be realized that the problem of making a highly efficient and speedy light car to hold the road is one already far on the way towards solution.

In the meantime the medical man would be wise to bear in mind that, while many varieties of light cars, assembled and otherwise, are available to him to-day, nevertheless the pick of the output is being taken, as it ought to be taken, by the Government for war service. For the rest, production is restricted by the necessity for the shops turning out other war requisites besides light cars.

As far as we can see into 1916, the only light cars likely to be available in large numbers are of the imported or of the assembled varieties; though by careful investigation here and there it will be possible to secure on occasion examples of what one might call the more classic makes that have been tried in war service and not found wanting.

A CAR TO BE LUBRICATED ONCE IN SIX MONTHS.

Turning next to middle-size cars which, from the inception of the motor movement to date, have rendered the medical profession the greatest amount and variety of service, we find that no such thing as a 1916 model has yet been announced by the British manufacturers. A few 1915 examples can be unearthed out of stock, and, of course, to the number of used cars that are being offered for sale as the strain of the war becomes more and more apparent on folks' finances, there would appear to be no end.

But there has lately been brought forward by the firm of J. B. Ferguson, of Belfast, a design for a middle-size motor-car which, as a design, is of considerable interest to the medical profession. It represents the conception of a machine of refinement of working which shall need the minimum of attention and which will nevertheless be so adequately oiled and lubricated throughout that there will be the minimum of wear on the parts, therefore the maximum of use will be obtainable. This will be called the 14–20 horse-power Fergus car. The first example has been on the road some time. I understand that in face of the impossibility of getting the type made in any numbers here the notion is to get most of the parts manufactured in America, each by a specialist.

The scheme embraces a four-cylinder 14–20 h.p. monobloc engine, in combination with a worm-driven back axle and cantilever springs. All the springs are leather bound, to ensure their retention of the lubrication, the feed of which is automatic, and to protect the leaves from damp. The side members of the frame are quite original, being of girder formation, combining great rigidity with lightness.

There are here no inaccessible parts for the owner to lubricate; consequently, no vital parts can be neglected in this connexion. In the average car of to-day there are anything up to eighty parts to attend to in the way of lubrication, many of them daily, whereas in the Fergus car there are only eleven parts to which lubrication has to be supplied, and each of these needs attention once in every six months only.

This is really studying the man who wants to look after his own car. Apart from trouble saving, automatic lubrication is preferable on the grounds of effectiveness. In turn this represents economy of wear and adjustments, and consequent reduction of repair bills to the minimum, it being assumed, of course, that each part is correctly designed for the work it is called on to do.

The frames, which are to be made at Messrs. Ferguson's own works by special presses, reveal that the designing talent employed is sound. Though of extremely light appearance, the combination of steel girder and lattice work design ingeniously provides strength precisely where

it is needed, the shape being determined by the conditions arising from the tension stresses at this point and the compression ones at that.

A New Year American Novelty.

As far as concerns vehicles not used wholly for business purposes, Mr. McKenna's autumn budget largely altered the prices of American cars in this country, though, so far, those who import these vehicles in parts, and assemble them here at little cost, successfully escape all but a fraction of the duty.

As from January 9th, 1916, one of the best-known and largest American motor firms—Willys-Overland—which has already established a reputation here, is putting on the market in this country a new model car, which, though imported completely assembled, will cost only £225 for the five-seater and £220 for the two-seater, both prices being inclusive of the full duty of 33⅓ per cent., which represents a contribution to the Exchequer of over £40 per vehicle.

Thus the price, including duty, is brought within the range of a very large public, while no less important is the fact that the whole plan of it is essentially European and not nominally so. The four-cylinder engine comes under the 4 guinea tax, being a fraction under 80 mm. in the bore with a stroke measurement of 127 mm. The cylinders are cast in a block, the valves being all on one side.

The engine might have been designed in Coventry. It is nominally of 12 h.p. and actually capable of developing over 20 h.p., so that here we have an American car rated according to European practice, as distinct from the American fashion of rating the motor at the very utmost power it is capable of developing for a brief spell.

The chassis is of European pattern, also in having cantilever rear springs, while the three-speed gear box is combined with the back axle on a system widely tested and found successful for many years. When the lower indirect speeds are in service, this scheme represents a reduction of engine torque to a quarter the amount experienced when the gear box is at the forward end of the propeller shaft. The weight of the complete vehicle comes within the ton limit, and the tyres are proportionately large. The equipment is complete, from electrical engine-starter and lighting system, embracing dashboard inspection lamp, down to detachable rims, including a spare hood cover, gauges, pockets, foot-rests, and so on. Of course, the gear-control and hand-brake levers are worked by the left hand, because they are centrally situated to the saving of weight and attaining a better leverage. I have seen the car, which will be widely announced in the general press from now onwards.

At the moment this is about all there is in the motoring situation calculated to be of interest to the medical man.

TENURE OF MEDICAL OFFICERS OF HEALTH.

Sir Philip Magnus, M.P. for the University of London, has maintained his interest in the subject of obtaining security of tenure for medical officers of health, which he took up at the request of the British Medical Association. Last February, in consequence of his representations, the then president of the Local Government Board, Mr. Herbert Samuel,[1] stated that he was prepared to issue an order providing that in the case of future appointments of whole-time officers (medical officers of health, and sanitary inspectors), whose appointments are subject to regulations made by the Local Government Board, the officer shall continue to hold office until he is removed by the local authority with the Board's consent, or is removed by the Board. He also undertook to suggest to local authorities that all officers holding temporary whole-time appointments should be reappointed under the new terms. Sir Philip Magnus has recently approached Mr. Samuel's successor, and the following correspondence has passed:

Local Government Board, Whitehall, S.W.,
December 30th, 1915.

My dear Magnus,

In accordance with the decision of my predecessor, which was contained in his letter to you of February last, my Department have prepared an Order giving security of tenure to whole-time medical officers of health and inspectors of nuisances appointed in the future.

I entirely agree with the decision at which Mr. Samuel arrived, and am strongly in favour of security of tenure for these officers, but I must confess that my own feeling is that the present is hardly the most appropriate time for the issue of such an Order, in view of the fact that so many of our best men have given up local work for service with the army or navy, and that the conditions are now quite abnormal.

Perhaps you would kindly let me know what your views are, and whether in the circumstances you would see any objection to the issue of the Order being further postponed.

Yours sincerely,
(Signed) Walter H. Long.

Sir Philip Magnus, M.P.

16, Gloucester Terrace, Hyde Park,
January 4th, 1916.

Dear Mr. Long,

I have carefully considered your letter of December 30th last, for which I am much obliged.

I agree with you that the present time may not be opportune for the issue of the proposed order of your Board giving security of tenure to whole-time medical officers of health and inspectors of nuisances appointed in the future.

I understand that your reasons for postponing the order are:

First, because many of the best men who previously held these posts are now serving in the army or navy, and that it is consequently undesirable that their places should be permanently filled by other applicants in their absence.

Secondly, because even when vacancies occur through death or resignation, such vacancies cannot be so efficiently filled at a time when competition for the appointments is necessarily restricted owing to the absence of many competent men who might be applicants.

These reasons seem to me quite sound, and I may add that the complaint has already reached me that advertisements have appeared in the press for the appointment by Local Authorities of medical officers to fill posts which have been vacated by those who are now serving in the army, and it is contended that these positions should be only temporarily filled, in order to enable the absent officers to resume their former duties should they so desire when the war is over.

In these circumstances, therefore, it certainly seems to me advisable that the issue of the Board's order should be further postponed.

I am, dear Mr. Long,
Yours very faithfully,
(Signed) Philip Magnus.

The Right Hon. Walter Long, M.P.,
President of the Local Government Board.

The public health service and the medical profession generally are greatly indebted to Sir Philip Magnus for his unwearying efforts to obtain the removal of the present disabilities of medical officers of health as regards security of tenure and other matters, and will, we have no doubt, agree with the general tenour of the letter with which the correspondence has at present closed.

[1] British Medical Journal, March 6th, 1915, p. 429.

ROYAL MEDICAL BENEVOLENT FUND.

(Continued from page 56.)

The following is a continuation of the summary of cases relieved by the Committee at its meeting on December 14th, 1915:

Daughter, aged 49, of M.D.Lond. who practised in London and India, and died in 1873. Applicant was able to supplement an income of about £20 per annum by teaching French, but owing to ill health is unable to continue this work. Relieved twice, £10. Voted £10 in two instalments.

Widow, aged 51, of M.D.Dub. who was in the R.A.M.C., and died in 1905. Applicant lives in a flat rent free, and has a small army pension. In addition to her four daughters, ages 21 to 26, she has her mother partly dependent on her. None of the daughters are strong, nor have they been trained for work. They have recently been training for nurses. Voted £5 and referred to the Guild.

Daughter, aged 55, of L.R.C.S.Glasg. who practised at Glasgow, and died in 1883. Applicant managed to earn a living before the war by teaching music, but since October, 1914, has practically lost all her pupils. Only permanent income £4 12s. per annum, and lives in own house. Voted £12 in twelve instalments. Recommended by the Glasgow branch of the Guild.

Daughters, ages 44, 50, 55, of M.R.C.S.Eng. who practised at Bodmin and died in 1912. Until father's death they were all able to live comfortably together, as the father had a life interest in some property. Only income of the daughters £5 each per annum. Voted £18 in twelve instalments jointly, and referred to the Guild.

Widow, aged 73, of M.R.C.S.Eng. who practised at Rye and died in 1891. Applicant has cataract in both eyes and unsatisfactory health. Has two daughters, both married. Lives in own house, but has only very limited means. Voted £12 in twelve instalments.

(To be continued.)

MEDICAL CARE OF SCHOOL CHILDREN.

(Continued from p. 56.)

TUBERCULOSIS.

THE chapter on tuberculosis in school children is chiefly noteworthy for the valuable tables giving figures concerning the extent to which tuberculosis is prevalent among children. The first of these tables has been compiled by Dr. T. H. C. Stephenson, superintendent of the Registrar-General's office; it gives the mortality at several ages from all causes and from tuberculous diseases for the last eight years in England and Wales. Death from all causes is high in the first year of life, being nearly ten times as great as that from all causes for the five succeeding years, and thirty times as great as in the second five years. From phthisis the deaths in the first year are as heavy as in the next five years, and nearly twice as heavy as in the second five years of life. In the succeeding five-year groups there is a gradual increase in the death-rate, so that in the group 20 to 25 years it is more than five times as great as in the 1 to 5 year group. Other forms of tuberculosis account for many deaths in the first year of life, the percentage being more than twice that for the succeeding five years; then, for each succeeding five years, there is a steady decrease in the tale.

Returns derived from the examination of school children suggest a slight diminution of the incidence of the disease amongst them. Comparative returns of town and country areas show that the incidence is higher for town areas. There is a solitary exception in the case of Worcestershire; the return of "phthisis" made by this county education authority is higher than that received from any other area, and it is nearly twice as heavy as the next largest on the list. In contrast to this the return for "other forms of tuberculosis" is well within the average. The figures are derived from the examination of 7,128 children, amongst whom 148 cases of phthisis, besides 250 doubtful cases, were reported. Such a return as this is another example of the desirability for some sort of cross-examination by the Board and the presentation of some explanation for the anomalous returns.

MEDICAL TREATMENT.

The report takes a very optimistic view of the progress of medical treatment amongst school children. Many of the most fruitful activities are of the nature of voluntary undertakings on the part of the local education authorities; the initiative in regard to treatment schemes rests with the local authority, and a considerable proportion of the cost is borne by the local taxpayer. The work has hitherto been placed, for the most part, in the hands of the local doctors. The introduction of the systematic examination and treatment of the children has produced a higher standard of health, both children and adults look upon accustomed ailments in a different light, and the desire for something better than the endurable has been fostered.

The war has put a check upon many of the activities of the school medical service, and perhaps in no branch has its effect been more heavy than in the stoppage of schemes of treatment. But it is considered to be "extremely important to maintain the machinery, both of inspection and treatment, in good working order. The need for such organization is likely to prove greater in the future than in the past."

A feature of the year is the great increase of the provision for dental treatment. In London for the year beginning April 1st, 1915, provision has been made for the treatment of 125,486 defects, including 63,140 dental cases. During the year the number of authorities providing treatment has increased from 139 to 179, and the treatment clinics now number upwards of 350. There appears to be a steady growth in the appreciation of the work by the people. Sheffield reports that the proportion of children obtaining treatment for which the education authority make provision has risen from 34 per cent. of the children treated in 1908 to 66 per cent. in 1914. It is satisfactory to note that there is a growing recognition of the view that the treatment of school children found on inspection to be defective is no part of the work of the voluntary charitable hospitals. This was first impressed upon the authorities by the inability of the hospital staffs to cope with a veritable inundation; now the authorities recognize that half the value of their costly inspection is lost by merely turning over the children to the out-patient departments adapted to the adult population. Children's cases need a systematic following up, both to secure regular attendance and the effective application of the remedies ordered; these desiderata can only be secured through the school authority's own staff or an associated voluntary Care Committee. The organization of treatment is not difficult in town, but it is quite otherwise in the counties; each district has its own particular difficulties to face, and, as no two areas are exactly alike in these respects, each county scheme has to be developed according to local circumstances. Notwithstanding the difficulty, the work is progressing. Out of 62 such authorities (London excluded) treatment of one form or another is now undertaken by 50; it includes treatment of minor ailments, dental defects, ringworm (*x* rays), tonsils and adenoids, defective vision, and the provision of spectacles. The chief difficulty in rural districts appears to be with the staffs. A nurse to be of any good must be on the spot, and there is not sufficient work to keep one school nurse. It is suggested that each of these small areas should have one whole-time nurse to attend to several public health duties—school attendance, school nursing, tuberculosis, and district health visiting. In some places the local medical practitioners work under contract scheme: medical specialists come from the central town of the area; a medical staff is appointed by the local education authority; a school clinic is staffed by the local practitioners, or the local hospital is used. It would appear that each of these methods has its rightful place according to the type of work. Temporary clinics, working in a district over a sufficient period and then being transferred to a quarter where there is more need, have been found valuable. An even more mobile form of clinic, the "travelling clinic," has been worked with great success for dental purposes by caravan; the equipment of one such clinic is carried by the dentist on the back of his motor car.

DENTAL DISEASE AND TREATMENT.

It is noted that there is a steady appreciation in all parts of the country of the necessity for dental treatment. Several doctors have made comparative investigations of the state of the teeth of children of different types. One writes: "On the whole the possession of perfectly sound dentures seems to confer unexpectedly small advantages. Even the apparent advantage in height and weight . . . may be a matter of race rather than of better health." Another found that "in general terms the best nourished children compared distinctly unfavourably as regards their teeth with the children as a whole," and he concludes that "in the aggregate bad teeth is not the cause of malnutrition in children." These conclusions are in conflict with those arrived at after similar investigations by other doctors. A most systematic inquiry was made in Lancashire, and a direct association between bad nutrition and bad teeth was found. Children with "excellent" nutrition had on an average 3.6 decayed teeth per child, with normal nutrition 4.4 bad teeth, with subnormal nutrition 5.2, and with bad nutrition 6.2 decayed teeth. Be the effect of bad teeth immediate or not there is no doubt of the national loss in the end. In the annual report of the Director-General of the Army Medical Service for 1910 it is written that 44.3 per 1,000 recruits were rejected on account of bad teeth. "This high ratio bears eloquent testimony to the poor dental conditions of the classes from which the majority of the recruits are drawn." If the state of the children's teeth be bad it is certain that the same persons when adults will have yet worse teeth, for all the evidence, of which some is given, tends to prove that there is a progressive deterioration in the state of the permanent teeth with every year of school life.

Of predisposing causes the two most important appear to be improper feeding of young children, and excessive sweet eating. Others put alongside these the lack of the toothbrush, and the effects of certain illnesses, such as rickets. But there is general agreement that food is the most potent influence. One illuminative observation comes from Dr. Milligan of Bootle; he has shown that children in the poor schools frequently have the cleanest and soundest teeth. This observation, we have reason to believe, is correct. He adds that "the reason for this is to be found

in the domestic arrangements of the poorer classes, and the fact that the children are left to pursue their natural aptitude for chewing uncooked fruit and vegetables." Of the virtue of the toothbrush there can be no question, but the assertion of one medical officer that "clean teeth do not decay," is unfortunately not of universal application.

The great benefit that may be obtained by short demonstrations given in the schools by the visiting doctors is brought out. These lessons, when well and dramatically given, with a sufficiency of blackboard illustration, arouse keen interest amongst the children, the teachers, and ultimately the parents.

Lengthy tables of figures are given of the incidence of dental defects in different areas, and here again we find the same conflict of testimony as in other figures. One would expect the figures of Cornwall and Torquay to bear some near resemblance, but they are as the poles asunder—Cornwall takes first prize for good teeth, Torquay is nearly last.

Mention is made of the need for experienced anaesthetists for the purpose of general anaesthesia, if and when this is practised. Dr. Norman Bennett lays great stress on this point, as important both from the patient's and the doctor's point of view. "Time is saved and the child benefited." It is worth while to quote one paragraph:

In the administration of nitrous oxide for children it is of cardinal importance to give a certain amount of air or oxygen. In this way struggling is prevented, cyanosis is minimized, and the anaesthesia is prolonged. This point was certainly not generally appreciated. The routine procedure of washing the face-piece after each administration was not carried out. After administration ceased an experienced anaesthetist can greatly assist the dentist by holding the head in a particular way, and by manipulating a Mason gag quickly and correctly when necessary. These points are of more importance with children than with adults, because they easily become more cyanosed, relaxation is often very sudden, and, generally speaking, the physiological changes induced by the anaesthetic are more rapid and less easily controlled.

Point is made that the general anaesthetic should not be given by the operator except in cases of exceptional emergency.

There appears to be considerable difference in the practice adopted at different dental clinics. The figures of the London area show this well: 32,430 children were attended to; taking the children as 1, the number of attendances was 1.5; temporary teeth extracted, 4; permanent teeth, 0.5; stoppings, 1. The extractions and stoppings vary considerably in the constituent clinics; two extremes are: Marylebone—temporary teeth extractions 9, permanent 1.3, stoppings 1; Peckham—temporary 2.8, permanent 0.1, stoppings 2. These would appear to be extreme examples of "radical" and "conservative" dentistry; and if the conservative practice is justified, then the rate of extractions in some places would seem to be excessive.

Open-air Education.

The demand for facilities for the open-air education of weakly children has caused many experiments to be made. The cost of special provision has led to the use of the school playgrounds. On this Dr. Hamer, writing of London, says: "The results of the classes appear to show that the average child gains considerable advantage in health and vitality from education upon open-air conditions, such as can be given in a suitable school playground. In connexion with the campaign against tuberculosis there is necessarily arising a demand for the further provision of facilities for open-air education for debilitated children. Although the ordinary playground class does not well suit the needs of the more delicate child of phthisical tendencies, the results of the Hackney Marsh class appears to show that there is room for the development of such children in open spaces and parks." There is a whole world of difference between an open space and the open draughts of a town school playground; the latter is pleasant enough for an occasional class in the summer, but in the winter it is no place for any but the active. Testimony is given to the excellent effects that have been derived from the activities of the boy scouts movement, and the establishment of holiday schools and camps.

The Cripples.

The incidence of physical deformity and the causes thereof are shown in several tables. Tuberculosis always heads the list; it accounts for about 40 per cent. of the cases. Next comes infantile paralysis with about 25 per cent., and rickets with 10 per cent. The remaining 25 per cent. are due to a variety of conditions ranging from accident to congenital deformity. There are now sixty-one special schools with accommodation for 5,005 children. A speciality of the education is to be found in the trade instruction given in the schools for elder children. Girls are taught fine needlework and dressmaking, the boys cabinet making, carpentry, and toy making. The work done by some of these schools is well worth examination.

A special investigation was made in London into the mental condition of the cripple children. The result was a complete overthrow of the popular idea that the cripple was of superior mental development. Amongst 1,080 children not more than 8.5 per cent. were up to the proper standard, and of the remainder who were below normal, 21 per cent. were of exceptionally low ability. A critical review of the cases of children suffering from paralysis shows that the mental development was inversely proportional to the height of the lesion. In poliomyelitis 48 per cent. were average children mentally, in hemiplegia 32 per cent., and in diplegia and paraplegia only 10 per cent. Excellent work is done by the after-care committees in the supervision of these children; every effort is made to associate them with societies, clubs, and other friendly associations, with a view to continuing educational influences and preventing degeneration. This section closes with an important paragraph headed

The Training of the Cripple Soldier.

It is hoped that the experience gained by some authorities in fifteen years' administration of cripple schools may be of timely use in helping to provide for cripple soldiers. Their numbers will be large; they will in many cases be unable to follow their old trades; they will have to be taught a new means of earning a livelihood, and their claim for consideration will be pressing. Many are already returning home, and no time is to be lost if they are to be saved from a condition of lifelong inactivity and poverty. The work already organized by Mr. C. Arthur Pearson for blinded soldiers at St. Dunstan's, Regent's Park, will serve to show what can be done in a short time: 50 soldiers are now receiving instruction in new trades; workshops are being erected and residential accommodation being provided for 120 men. They are being taught carpentry, boat repairing, mat making, basketry, and poultry farming, bee keeping, market gardening, and massage. Special attention is given to recreation, including rowing and swimming. A similar effort, though unhappily on a much more extensive scale, is required for cripple soldiers. In order to make appropriate provision in particular areas or in suitable circumstances four steps may be taken as follows:

1. A complete register of cripple soldiers should be formed, suitably subdivided into those who are trainable and those who are not.
2. Local education or other committees should co-operate with the military authorities on the one hand and ameliorative agencies on the other with a view to organizing a scheme of training.
3. Day and residential technical classes should be established, and the subjects should include carpentry, cabinet making, toy making, tailoring, boot making, horticulture, etc. Provision should also be made for the apprenticeship of students to craft trades of higher type—watchmaking, engraving, working in precious metals, etc.
4. After-care supervision would be necessary, and in many large towns considerable experience has now been gained in the work.

Schools for the instruction of cripples, if established by local education authorities, can be recognized for grants under the Board's regulations for technical schools. The Board is therefore in a position to assist movements of this nature, not merely in advising as to the scope and nature of schemes of instruction, but by affording financial aid.

The report contains also sections dealing with physical training, provision of meals, and the employment of children, but no new facts arise for remark. Among appendices, the most important appears to be that dealing with the physical defects of leavers in industrial areas, in residential towns, and in rural areas.

In the autumn of 1915 the incidence of diphtheria in Berlin assumed alarming proportions, and in the eight weeks August 1st to September 25th 1,276 cases were notified, as compared with 907 in the same period of 1914. The deaths from diphtheria in these eight weeks of 1915 numbered 111, as compared with 74 deaths in the same period of 1914. The authorities in Berlin increased the staff of nurses, and steps were taken to provide antitoxin free of charge.

British Medical Journal.

SATURDAY, JANUARY 15TH, 1916.

THE CAMPAIGN IN EAST AFRICA.

It seems clear that a campaign of considerable importance is commencing in East Africa. Like all campaigns in tropical countries, its success will, in large measure, depend on the efficiency of the means adopted to prevent the occurrence of disease among the troops engaged.

When large bodies of men, natives of a temperate climate, are brought into a tropical country, they are exposed both to the diseases which they may carry with them from their homes and to diseases indigenous in the country to which they come. Troops brought to German East Africa from South Africa or elsewhere may therefore suffer both from the ordinary diseases of their native countries and from those tropical diseases which exist in East Africa; the fatigue and exposure inseparable from military operations will add greatly to their susceptibility. Owing to these two causes the problems presented to the military medical officers by the East African campaign will be especially difficult of solution, and success will, to a great extent, depend upon the loyal co-operation of the troops, and upon the observance by all ranks of the preventive and curative measures advised by the medical authorities.

German East Africa covers so large an area that local conditions vary greatly in its different parts and with the season of the year. But while it is on this account not possible to go into details, some of the special difficulties which will be met with during the East African campaign can be described and the methods by which they may be successfully countered stated in a general way.

There will probably be little difficulty in controlling the diseases which the troops bring with them, though it must not be forgotten that sometimes in East Africa it may be cold enough to make pneumonia, and other diseases often precipitated by exposure, a real danger. Minor tropical diseases, such as various indeterminate fevers of short duration, are certain to be a source of discomfort, and it has to be remembered that there are centres in East Africa where plague is endemic; but these will probably be avoided.

The four diseases which might very seriously interfere with the success of the East African Expeditionary Force are tick fever, malaria, dysentery, and—especially if it is necessary to use animal transport to any great extent—trypanosomiasis.

Tick fever occurs everywhere along the Central African trade routes. The disease is caused by a spirochaete, which is carried from man to man by the bites of a tick, though it may also be transmitted by lice. The fever develops soon after the infecting bite. It is a relapsing fever, consisting of three or more attacks, each of three or four days' duration, recurring at intervals of about a week. If untreated, the disease will incapacitate a man for about five weeks, more or less. If those infected are quickly treated by the injection of salvarsan and properly nursed, recovery is prompt and the mortality very small. If, on the other hand, there is a lack of proper treatment and nursing, the mortality may be high. The tick—called in Swahili *Kimputu*—is found wherever Swahili traders have gone. In its habits it is much like a bed-bug, and is certain to be found in every native house, new, old, or deserted, along the trade routes. Natives living in districts where ticks exist will often deny their presence or insist that a tick bite has no ill effects. Such persons have become immune to the fever; newcomers, who sleep in houses where ticks exist, are almost certain to be bitten and to be attacked by the fever. There are on record many instances in which caravans coming from a tick-free to a tick-infested district have been stopped because every individual comprising them had contracted tick fever. Since the ticks only exist in native houses, and especially along established trade routes, they may be avoided by sleeping always in camps instead of in native towns and by avoiding old camping places on trade routes.

Means should be, and no doubt will be, taken to impress on every soldier engaged that malaria is caused by a parasite transmitted from man to man by a mosquito. When once this fact is firmly fixed in the minds of soldiers the necessity for mosquito nets will become apparent to them, and they will also be able to understand the need for the careful control of those who have chronic malaria and for the prophylactic use of quinine. French and Belgian native soldiers have for many years shown that it is possible for a soldier to use a mosquito net; they count as one of their most necessary possessions a box-like mosquito net which weighs perhaps half a pound and measures about 3 by 3 by 6 ft. when open. It is supported by strings from the top and has no side opening. These nets are made of mosquito netting when it can be obtained, but more often than not of common white cotton cloth, "Americani." If our troops employed such nets, and if each man took daily with his dinner from 3 to 5 grains of quinine, much would have been done towards lessening the number of men who will be invalided on account of malaria. Another point of personal hygiene is to wear knee-breeches, or better, baggy knickerbockers, and not shorts which leave the knees bare; shorts seem very popular among our men in warm climates, but they expose an unnecessarily large area to the attentions of the mosquito, the tsetse, and the tick. An administrative point which ought to be constantly before the minds of officers, including those on detachment duty, is that native children very commonly harbour the malarial parasite; the proportion varies, but is usually very high, even among those children who appear to be in good health. The fact affords an additional reason for avoiding native villages and camping in the open beyond the range of the excursions of the small child.

Bacillary and amoebic dysentery both occur in East Africa, and are contracted by the ingestion of contaminated water or food. Water is an especially common source of infection, but all ranks should be urged not only rigorously to abstain from drinking water that has not been boiled or sterilized otherwise, but also from eating uncooked food. The flat taste of boiled water, at first disagreeable, is no longer noticed after it has been used for a week. Circumstances may make it impossible for drinking water always to be sterilized by heat, and in such an event chlorination might be substituted.

The trypanosomes of "sleeping sickness" and "tsetse fly disease," popular names applied to trypanosomiases affecting men and animals respectively, are transmitted from animal to animal, or from man to man usually by the bites of a tsetse fly, but some-

times by other biting flies. Unfortunately, there is no uniformly successful treatment for these diseases. As there is no drug by which they can be controlled, it is doubly important that the bites of flies should be avoided. It is often possible to do so by keeping away from the neighbourhood of streams and areas where the flies are known to occur.

Tropical medicine has attracted many students during the past few years, and it is certain that there will be no lack in the field of medical officers who have both a practical and theoretical knowledge of tropical diseases. The great advantages which might be derived from the establishment, at some convenient point or points, of well-equipped laboratories are very apparent. Such laboratories would be of the utmost value not only for diagnostic but for remedial purposes.

A successful outcome to the application of the measures the military medical service will advise for safeguarding the health of an unusually large military expedition in a tropical country will be eagerly expected. In order that this fortunate result should be attained it seems essential that men as well as officers should understand something of the reasons for the precautions recommended. A brief printed statement about mosquitos and malaria, ticks and the fever they cause, about dysentery and trypanosomiases, would enable them to understand the instructions concerning the use of mosquito nets and the proper employment of a water-bottle, and prepare their minds to benefit from the talks and admonitions that medical officers serving in East Africa will, without doubt, give to the men of the commands with which they are serving.

EDUCATION TO-DAY AND TO-MORROW.

LAST week a number of societies concerned with education, and consisting for the most part of associations of schoolmasters and schoolmistresses, met in London; they were linked by a conference of educational associations, opened on Monday, January 3rd, in the Great Hall of the University of London by the Vice-Chancellor, Sir Alfred Pearce Gould. An inaugural address was delivered by the Principal of the University of Birmingham. He spoke on education after the war, and this subject, and that of education during the war, were the chief topics discussed at all the meetings. Sir Oliver Lodge said that the educational danger of Germany had been disclosed by its conduct of the war; it was the heavy pedagogic grind, the desperate worship of material good, the soulless preparation for business, and the concentration of a purely material idea. The old sentimental Germany with a message to the soul of the human race had been slain, and a ruthless monster had taken its place. The dangers in this country were, he thought, the neglect of intellectual things and concentration on physical prowess and a passive kind of material prosperity; the satisfaction with book knowledge; and widespread indifference to natural facts not only among the general public but among the leaders, leading to contempt for investigation and expert knowledge. Canon Masterman, in addressing the Teachers' Guild of Great Britain and Ireland, took up the same parable. The Prussian leaders of Germany after 1870, he said, had extended the claim of the State over the bodies of its citizens to their minds, and even, in Bismarck's *Kulturkampf*, to their souls. Education had shown itself capable in unscrupulous hands of producing one of the most colossal catastrophes in history. Our fault in this country, on the other hand, was the lack of a clear idea of the object of education; consequently, the results were not proportionate to the cost and effort they involved.

Very little was said at any of the meetings about the teaching of Greek and Latin, but a great deal about the need for proper instruction in modern languages, and also for giving better opportunities for becoming acquainted with the modern literature of foreign nations.

When we come to look into matters of detail we are attracted by a very outspoken address by the Professor of Applied Mathematics in the Imperial College of Science, and some rather revolutionary proposals with regard to medical education by the Regius Professor of Medicine at Oxford. Professor Whitehead, in pleading for a reform in the aims of education, said that the devil in the scholastic world of this country had assumed the form of a general education consisting of scraps of a large number of disconnected subjects, and with the artfulness of the serpent had entrenched himself in the ditch of the matriculation of the University of London, with a wire entanglement formed by the Oxford and Cambridge schools examination. English education, he asserted, was suffering from a lack of definite aim: we had not made up our minds whether to produce amateurs or experts, but he insisted that it was impeded also by external machinery which killed its vitality. His conclusion was that the results of education in the schools should be tested not by rigid examinations of the pupils, but by proper inspection and correction of the schools, while leaving each a unit with its curriculum based on its own needs.

Sir William Osler, in addressing the public schools science masters, pleaded that boys designed for the medical profession should leave their hands fit to begin their special studies. He urged that earlier and more extensive work in science subjects would save time at the universities. He ventured on the assertion that by the time a boy was 16 he had already, in the majority of instances, selected his career, and from that proposition deduced the conclusion that the sixteenth and seventeenth years should be devoted to the preliminary sciences—physics, chemistry, and biology. A boy would then be fit to go to the university at 18 and to proceed at once with physiological chemistry, physiology, and anatomy. He contended, therefore, that the school problem was to organize teaching so as to have a continuous science course through two years, and for this teachers, laboratories, and a systematic organization of the courses were necessary. The teaching in chemistry at the schools was not yet good enough, but if it were improved in this and the other preliminary sciences he believed that by shortening the vacations and rearranging methods of instruction it would be possible to return to a four years' curriculum for medical students. The average man would then qualify at the age of 22, spend a year in hospital or in post-graduate study, and start in life at 23. Sir William Osler argued that at present valuable time was being lost and much needed money wasted because science was a Cinderella in the kitchen instead of being the dominant partner in the educational family.

Sir William Osler's picture of the possibilities of the future is very different from that drawn in the reports to the General Medical Council of the actual state of things in the recent past. From a report made by the Education Committee, after a very full investigation of the curriculum of 1,111 who qualified in 1906, it appeared that the mean length of the curriculum in the United Kingdom was seven years (6 years 11.3 months). In England it was seven and a half

years, and in Scotland and Ireland a little over six and a half years. One result was that the mean age of qualification was in England 26 years and in Scotland and Ireland 25 years. This is with a minimum curriculum of five years. The report, it is true, was prepared nine years ago, but there is no reason to suppose that there has been since then any important alteration.

We are not quite sure whether Sir William Osler means to suggest that the minimum curriculum should be reduced to four years, or whether, if so, it would have any such effect in reducing the average age of qualification, as he supposes. Already teachers at all schools are complaining that it is impossible to crowd into the five years all the subjects which a student ought to learn, and it might be that the reduction of the length of the curriculum would only have the effect of increasing the number of rejections at examinations. But we take it that he would advise any reduction only if his other proposals with regard to the improvement of scientific education at schools and early differentiation of boys at schools were also accepted. We are disposed to think that the cry about the shortage of doctors at the present time has been exaggerated, and have seen no conclusive argument that there will be any shortage after the war. We may, perhaps, take warning by the example of Germany. At the beginning of the war the Government of that country relaxed the regulations and permitted a large number of senior students to obtain a licence to practise after examinations taken at an earlier date and under less stringent conditions than prevailed before the war. This policy has been strongly condemned by the medical profession in Germany. We are far more disposed to agree with Mr. Runciman, who in a very admirable speech in the debate in the House of Commons on January 10th laid it down that one of the first necessities of this country, if she wishes to hold her own during the time of war and when the war is over, is to improve research methods, the education of the people, and the training of young men. He repudiated the suggestion that we should attempt to economize on the money now spent on colleges and modern appliances. "There are," he said, "other directions in which we can cut down expenditure with less national damage."

It is, we submit, something of a disgrace to our great public schools and to the universities of Oxford and Cambridge that a man, after passing through those venerable institutions with the highest distinction, may be totally ignorant, and will not be ashamed to admit that he is totally ignorant, of the elements of science—ignorant not only of the facts, but of the methods of science, and void of the intellectual training which it affords.

THE ARMY COUNCIL AND MEDICAL RECRUITING.

The following official communication has been issued by the War Office (January 12th, 1916):

"The Army Council consider that no qualified medical practitioner who is willing to accept (if offered) a Commission in the Royal Army Medical Corps should be accepted as an ordinary combatant.

"It is understood that the Central Medical War Committee will circularize the profession, stating that any medical practitioner who has enlisted under the group system should immediately enrol himself under the Committee's scheme as willing to accept a Commission in the Royal Army Medical Corps, if offered him.

"To every practitioner who enrols the Committee issues a Certificate of Enrolment.

"Every medical practitioner who has attested and enrolled under the Central Medical War Committee's scheme should, when called up, produce to the recruiting officer his Certificate of Enrolment. He will then not be posted to a combatant unit, and will await instructions from the Central Medical War Committee."

The draft of the circular letter referred to above was considered by the Central Medical War Committee at its meeting on January 12th, and will be issued immediately.

WELFARE OF MUNITION WORKERS.

The Health of Munition Workers Committee has presented a memorandum to the Minister on the need of careful supervision of the welfare of munition workers. Attention is drawn to the deficient housing accommodation in certain districts and to difficulties of transit when no local accommodation at all can be obtained; to the need for the provision of adequate and appetizing meals at the works, and generally to the subject of the means which should be taken to prevent mental strain produced by long or exceptional exertion. The problem concerns at least three classes—adult men, boys, and women. In some munition works steps have already been taken to extend the movement in this direction started before the war. In 1913 a conference of thirty representatives of welfare workers at a number of factories was held at York. Since then the number of such workers has largely increased. At one of the largest of the munition factories a chaplain, who before taking orders served several years in a large engineering firm, has been appointed to adjust difficulties in the families living in the hostels, to look after the children, and to organize healthy recreation, both indoor and outdoor; a doctor has been appointed, and an infirmary, with a small operating theatre, has been taken over for cases removed from the hostels. At another factory the supervisor looks after safety appliances and organizes first aid stations and canteen accommodation. In the case of another munition firm a shop committee has been made the intermediary for dealing with various questions affecting the detailed management of the workshops and the institutions for the benefit or pleasure of the men, such as dining arrangements and rifle clubs. Women supervisors, where the need for them was felt, have been most successful, for it has been found that the presence of a capable woman, of broad sympathies, has provided the best and quickest aid to the solution of many of the problems affecting women's labour. Her duties include such matters as the provision and maintenance of sufficient sanitary accommodation, and general supervision of the woman's health to see that she is capable of withstanding the physical strain and stress of work, and to endure long hours, overtime, or nightwork. It is recommended that a woman of good standing and education, experience, and sympathy should be selected for such work; she should live near the factory, and in "national" factories should be appointed and paid by the Ministry of Munitions, in "controlled" establishments by the employer, but her appointment should be reported to the Ministry. It is pointed out that courses of social study designed for students preparing themselves as members of various local authorities and as welfare workers in factories have been established in the universities of London, Birmingham, Manchester, Leeds, Bristol, Edinburgh, and Glasgow.

WELCH'S BACILLUS.

In a recent elaborate study of the *Bacillus welchii* Dr. J. P. Simonds[1] gives a clear, though necessarily inconclusive, account of a group of microbes that has

[1] *Monographs of the Rockefeller Institute for Medical Research.* No. 5. September 27th, 1915. New York. (S. roy. 8vo, pp. 130. $2.00.)

occupied the attention of pathologists and bacteriologists for many years. The bacillus of Welch was first fully described by Welch and Nuttall in 1892; Dr. Simonds has collected from the literature no fewer than 476 references to papers and books dealing with it and its congeners. Welch's bacillus is one of a group of bacteria the members of which defy satisfactory classification. Welch and Nuttall named their organism *B. aërogenes capsulatus*; identical or closely related bacterial species have received eight or ten other names, and include Achalme's bacillus alleged to be the cause of acute articular rheumatism, Klein's *B. enteritidis sporogenes*, Veillon and Zuber's *B. perfringens*, Fraenkel's *B. phlegmonis emphysematosae*, and many other varieties of "gas bacillus" generally. The literature abounds in contradictory statements as to the biological characteristics of these bacilli, and it may be added that these characteristics are liable to considerable changes in accordance with the methods of culture or subculture employed. Speaking generally, however, the bacteria are large, anthrax-like, Gram-positive, non-motile, strict anaërobes; they form spores in alkaline media, and bring about the stormy fermentation of milk—coagulation takes place quickly, and the clot is broken up by the abundant formation of gas. After an elaborate consideration of their cultural characteristics, Dr. Simonds proposes to divide the bacteria of this group into four subgroups, on the basis of their ability to produce acid and gas or to sporulate in media containing inulin and glycerin. He notes the great variability among members of the group in the formation of toxins and haemolysins and in pathogenicity to both animals and man. In man either local or general infections of the most various tissues and organs of the body by these microbes have been recorded; gas formation is habitually observed, and in many cases leads to the production of "foamy" organs or emphysematous gangrene, a condition that has unfortunately received abundant illustration among the wounded in the present war. Some years ago Herter endeavoured to show a connexion between pernicious anaemia and the presence of excess of *B. welchii* in the stools of the patients; the connexion of the bacillus with epidemic or sporadic diarrhoea in either children or adults is much more definite, and is discussed by Dr. Simonds at full length. The bacillus is undoubtedly a normal inhabitant of the intestines of adults, and is sometimes found in small numbers in the stools of infants; if the bacilli are present in excessive numbers, and if the diet contains an undue proportion of fermentable carbohydrate, diarrhoea with highly acid stools is likely to result. Dr. Simonds claims that the number of spores of *B. welchii* in the stools, estimated by a technique which he describes, is a reasonably accurate index of the number of actively fermenting, disease-producing organisms of this type higher up in the intestine. The acid they produce is butyric acid, and this is a highly irritating substance. The condition may be cured by substituting a diet rich in protein for one rich in carbohydrate, and by giving butter-milk which encourages the growth of bacteria producing lactic acid at the expense of those producing butyric acid.

THE MEDICAL TOPOGRAPHY OF PERSIA IN 1873.

IN view of our present military commitments in Persia and the valley of the Euphrates, it is not without interest to read an account of the climate and prevalent diseases of that district as they were recorded by an officer of the Army Medical Department—Surgeon-General J. H. Evatt, C.B.—in 1873,[1] in the course of a tour of inspection up the Persian Gulf and on to Bagdad. The possible importance of such a route from Europe and Asia to India was the motive of the journey, and such notes were taken as might prove useful to an officer of the Army Medical Department engaged in service there or thereabouts. From the point of view of health and sanitation the report is depressing. Of Bushire, the chief town near the head of the Persian Gulf, it is said that "Remittent fever of a bad type is common. Dysentery is common. Cholera rages from time to time. Ophthalmia is common." Of Basra we read that the town and neighbourhood are "decimated by malarious diseases, such as ague and remittent fever. . . . Every man in Bassorah has ague. . . . Cholera has several times attacked the place. . . . The Bagdad or Aleppo boil has marked many people here." Higher up country, at Kurna, where the waters of the Tigris and Euphrates join, the traveller in 1873 had at least the felicity of viewing the Garden of Eden, although it was not even then at its best. We are told that "to-day the happy garden is the post of some Turkish soldiers; around the base of the reputed tree of knowledge, which is still shown to travellers, useful vegetables grow, and high up above the garden I noticed in mid-air the telegraph wire. . . ." But at the present time the Garden of Eden is no longer to be found at Kurna, if Sir William Willcocks is to be believed, but much further off, in Mesopotamia. Between Kurna and Bagdad lay 350 miles of desert crying out for irrigation and cultivation in 1873 as at the present time. Bagdad in 1873 had a population of nearly 100,000, and was full of disease; in 1832 it lost 60,000 of its 150,000 inhabitants by plague, and forty years later had still not recovered from the shock. Cholera, Bagdad boil, fevers of remittent and low type, and small-pox are mentioned as the chief medical scourges. "The hospital accommodation for the civil population is almost *nil*. There is a municipal physician, an Englishman, but he has no medicines. . . ." It is observed that the civil hospital had been annexed temporarily by the Turkish Viceroy for the military, and was an excellently appointed institution. It is particularly interesting to note that the writer of this report considered the construction of a railway down the Euphrates valley, as an alternative to the road through Egypt, ridiculous from the British point of view, adding, "Indeed, no other nation wants this line but England." Subsequent history has not confirmed this view of the matter; but the writer's final conclusion may be quoted with the most complete approval: "The simplest way to keep the road to India open is by being strong in Egypt, and such we can any day be."

[1] Army Medical Report for 1874, vol. xvi.

THE FULL DIET FOR ENTERIC FEVER IN CHILDREN.

DR. H. D. CHAPIN remarks[1] that in New York, at any rate, enteric fever occurs at least as freely among children under 14 years of age as it does among adults. Thus, in an epidemic occurring towards the end of 1913, of 521 cases, 36 were under 5 years old, 98 were aged 5 to 9, and 87 were aged 10 to 14—in other words, over 42 per cent. were 14 years old or less. The epidemic was traced to infected milk; 70 per cent. of the cases reported were getting milk from one dairy. When the milk from this source of supply was cut off by the New York Health Department the epidemic ceased. Dr. Chapin treated 11 children, aged from 2 to 8, during the epidemic. All recovered, and all gave a positive Widal reaction; none showed any rose spots or enlargement of the spleen. The blood counts taken showed little diminution in the red cells and no leucopenia except in one instance; a differential count of the white cells, which averaged 8,300 per c.cm., showed a relative increase of the polymorphonuclears at the expense of the lymphocytes. The gastro-intestinal symptoms were not marked; the children all received the general ward diet with the exception of meat; the attempt to make them take food to the heat-value of 40 calories per kilo of body weight was not successful while the fever lasted, which was for twenty-two days on the average. No severe complications and no relapses were recorded. It is of interest to note that the diagnoses made before the

[1] *Transactions of the American Paediatric Society*, 1915, xxvi, 51.

admission of these patients were very various. Enteric fever was diagnosed in 5, and no diagnosis was made in 2; in the remaining 4, meningitis, miliary tuberculosis, bronchitis, and Brill's disease (an aberrant type of typhus fever, in all probability) had been diagnosed. The value of a diet of high heat value in the case of children with enteric fever is further elaborated by Drs. L. E. La Fétra and L. C. Schroeder,[2] who have treated 48 cases, aged from 1 to 12, on these lines. Dr. A. I. Kendall[3] had given good physiological and bacteriological reasons for supplying enteric patients with a full diet rich in carbohydrates; and Coleman, in an account of his experience with 111 cases, had found that an increased amount of fat in the dietary did not tend to cause diarrhoea. Drs. La Fétra and Schroeder's patients were treated on the usual lines, being sponged if the temperature reached 103.5° F., and being kept in bed on balconies or in rooms with open windows. Seven patients received vaccine treatment, which had no perceptible influence on the course of the disease. All 48 but one recovered; the death was due to pneumonia. It is noted that the general condition of the patients was remarkably good; the average stay in hospital was four weeks, varying from two to eleven. Abdominal distension was present in six instances, and was troublesome in only one; five patients had blood in the stools. In two cases the loss of blood was serious, and one patient, aged 11, was thrice transfused with 160, 260, and 280 c.cm. paternal blood by the Lindemann method, and also had saline solution intravenously twice and two injections of horse serum. He lost the greatest amount of weight, but during convalescence made up for this by taking a diet equivalent to 8,000 calories a day, or 310 calories per kilogram. In thirty-seven days he increased in weight from 45 lb. to 72 lb. A full account and analysis of the diet in these cases is given; the number of calories actually taken after the first few days varied from 100 to 300 per kilo. Unless toxic nervous symptoms were present, high fever did not prevent the children from taking a generous diet. The diagnosis was established, in 47 of the cases, by a positive Widal reaction in 44 and a positive blood culture in 36. During the course of the fever 29 patients gained in weight, and all but 4 were heavier on leaving the hospital than on entering it. As for the diet itself, the children were fed every three hours from 6 a.m. to 9 p.m. The food was such as would be taken by a child in health, with the exception that chicken cream was the only meat used; eggs and toast were offered from the beginning; lactose, cocoa, and cream were added to milk, which was practically the only liquid food. Among the other solids were bread, biscuits, potato, custard, apple sauce, cereals, and the like. For example, a child of 5 on the ninth day of the disease, with a temperature of 100° F. to 103° F., was taking a diet of 2,430 calories value, containing a pint of milk, half a pint of cream, 17 oz. cocoa at one meal, 3 eggs, 3 slices of bread, and 2 oz. milk sugar. It is noted that the tact and encouragement of the nurses were of great assistance in getting these large diets consumed. The conclusion is reached that the high calorie diet prevents the emaciation customary in enteric fever, greatly increases the comfort of the patients, prevents the occurrence of severe nervous symptoms (which are attributed to the toxaemia of starvation), and lessens the dangers of the disease and its complications.

ACTINOMYCOSIS AND ACTINOBACILLOSIS IN OXEN.

ACTINOMYCES, or the ray fungus, discovered by Bollinger in 1877, is well known to bacteriologists and pathologists as the most important organism of the streptothrix group, and it is recognized that there are at least two different forms of the ray fungus—*Actinomyces bovis* and *Streptothrix israeli*. The actinobacillus, first described by Lignières and Spitz in 1902, is a distinct organism, but produces in cattle various forms of disease clinically indistinguishable from those due to infection with the ray fungus. Epizootics of what is commonly called actinomycosis, but due some to the one and some to the other, have been of common occurrence in the herds of cattle in the Argentine and elsewhere. The Local Government Board has published a report[1] by Dr. F. Griffith, who mentions that out of 85,455 imported ox tongues examined by inspectors of foods in the city and port of London between August and October, 1913, no fewer than 4,949 were found to be infected with actinomycosis, chiefly in the glands. In order to determine the exact nature of the organism causing this bovine actinomycosis, or, to use the more comprehensive name suggested by Lignières and Spitz, actinophytosis, Dr. Griffith has examined 44 specimens taken from oxen slaughtered in this country, 45 Argentine tongues, 2 tongues from North America, and 2 frozen tongues from Siberia. The tongue itself was infected in one Argentine and the two North American cases, showing scattered fibrous nodules up to a centimetre in diameter, and containing gritty or gummy granules consisting of Gram-negative, radiating clubs, and finely granular débris. In all the other cases the tongue itself was not infected, but caseating glands surrounded by fibrous tissue and containing granulation tissue or semi-purulent matter with masses of more or less Gram-negative radiating clubs were found attached to it. No definite success attended numerous attempts to grow the causal organism infecting these imported tongues and their glands; inoculation experiments also proved failures. Investigation of the 44 British cases yielded Dr. Griffith rather different and more satisfactory results, given in detail in the report. In 40 instances the infecting organism showed Gram-negative granules and clubs, and pure cultures of it were obtained in 23 cases; all 23 gave identical Gram-negative specimens of the actinobacillus, and a culture, inoculated into a calf, produced a local lesion with the characters of a natural actinomycotic lesion. The histological features and the anatomical distribution of the disease in these 40 specimens were identical with those of the Argentine actinobacillosis described by Lignières and Spitz, and with those of the 49 imported specimens already described. The remaining four British cases Dr. Griffith puts into a class by themselves; the lesions were situated in each case in the inferior maxilla, and the specific granules formed by the infecting organism were composed of clubs and Gram-positive organisms, including branching filaments, chains of coccal bodies, and short bacilli. Dr. Griffith reaches the general conclusion that actinobacillosis is widespread in the world, and forms a considerable proportion of the cases of disease in oxen known as actinomycosis.

X-RAY INTENSIFYING SCREENS.

So many radiographers are now using intensifying screens to accelerate *x*-ray exposures that one little practical point, brought out in the course of a discussion on the subject at a recent meeting of the Röntgen Society, may be worthy of note. It is that, if an intensifying screen is used, there is no need to employ a special *x*-ray plate, and some speakers even claimed that the results when the *x*-ray plate was not used were quite distinctly better. Care should be taken, however, to choose a plate which is specially sensitive to the blue-violet light of the screen. The trouble with these intensifying screens seems to be that, while they will give contrast, they blur the very fine detail; and therefore, in chest work, for example, if the instrumentation is such that a full and rapid exposure can be obtained without them, this course is to be

[2] Ibid., p. 67.
[3] *Boston Medical and Surgical Journal*, 1913, clxviii, 825.

[1] Reports to the Local Government Board on Public Health and Medical Subjects. New series, No. 107: A Preliminary Report on the Pathology of Bovine Actinomycosis. Food Reports, No. 23. London: J. Truscott and Son, Ltd. 1915. (Price 2d.)

preferred. In the case of ordinary *x*-ray action the radiation goes right through the grains in the body of the photographic film, but when an intensifying screen is added the action is more like that of light, and the two things work one against the other. Thus the screen cannot increase, and must to some extent destroy, the rendering of fine detail. If a screen is used, the best results are obtained with about one-tenth of the normal exposure, and the tube should be slightly softer for a given subject than would be used if the exposure were made without the screen. Great care should be taken to avoid finger-marks on the screen, which should be dusted with a fine camel-hair brush. The after-phosphorescence of the screen is an important point; this may persist for a few seconds or for as long as twenty-four hours. After-phosphorescence for a few seconds is useful, because to a certain degree it increases the rapidity of the exposure; but beyond this it is a disadvantage, because it upsets subsequent exposures, and the ideal would be never to use the same intensifying screen again the same morning or afternoon.

THE ALLEGED INCREASE OF INSANITY.

DR. SYDNEY COUPLAND, who is a skilled statistician, examines the question of the alleged increase of insanity in his recently published Harveian Oration. He shows that the number of insane persons known to the authorities has been continually increasing, out of proportion to the increase of population, for the last fifty-five years. A great part of this increase is due to three causes: first, that a far larger proportion of the insane has become known to the central authorities; secondly, that the death-rate has continually diminished, thus allowing of a larger accumulation; and thirdly, that the recovery-rate also has diminished, with a similar result. The only sound criterion for determining whether or not there is a real increase of lunacy is, he shows, that based upon the numbers admitted to care who are attacked for the first time. It appears—and the admission is rather surprising—that the proportion of first attacks to total admissions has been observed only since 1907. During these eight years the total number of the insane in institutions per 10,000 of the population has steadily increased from 28.25 to 30.19, while in the same time the number of those who were admitted for a first attack has increased, but not steadily, from 4.12 to 4.26 per 10,000 of the population. From these figures Dr. Coupland draws the conclusion that the ratio of first attacks to the population has remained fairly constant, at about 4 per 10,000, while the proportion borne by the total number under care has risen from 28 to 30 per 10,000. This is one way of putting it, but there is another not quite so comforting. The increase from 28.25 to 30.19 is an increase of 6.868 per cent.; the increase from 4.12 to 4.26 is an increase of 3.374 per cent.; so that actually the proportion of first attacks to the population has been increasing nearly half as fast as the proportion of the total number of the insane. This is not quite as comforting as Dr. Coupland's assurance, nor is there much comfort to be extracted from his admission that part of the increase of the accumulation is due to a diminished recovery-rate. The only hope that our present knowledge of insanity permits us to entertain of appreciably diminishing the number of "first attacks" lies in diminishing habitual and long enduring drunkenness and in diminishing the incidence of syphilis.

THE BIRTH-RATE IN WAR TIME.

IN a note published in the BRITISH MEDICAL JOURNAL of December 25th last year, p. 935, comment was made upon the apparent increase in the birth-rate of males during the last few months. Further light is shed upon this obscure subject in a paper published recently by Dr. R. J. Ewart,[1] dealing with the influence of the age of the grandparent at the birth of the parent on the number of children born and their sex. As a result of a minute statistical inquiry, Dr. Ewart concludes that the prenatal mortality has an important effect on the production of variations of the sex-ratio at birth in any community. Prenatal mortality affects males more than females, and is closely connected with infant mortality, which is itself higher in the case of elderly parturients. How far these considerations would explain the predominance of male over female births alleged by "F." and Dr. Peck in the note referred to above is an interesting question that could be solved only by painstaking statistical investigations.

[1] *Journal of Hygiene*, vol. xv, No. 1, 1915.

IN the list of New Year honours published last week the name of Dr. A. W. J. MacFadden, Chief Inspector of Foods, Local Government Board, was accidentally omitted. He has been appointed a Companion of the Bath in recognition of services during the war.

FROM a statement issued by the President of the General Medical Council it appears that the number of medical practitioners whose names were added to the *Medical Register* in 1915 was 1,526. This included 269 practitioners with colonial and foreign qualifications. The annual average number added during the five years 1910–14 was 1,172. The number of medical students registered in 1915 was 1,918. The annual average during the five years 1910–14 was 1,441.

Medical Notes in Parliament.

War.

Battle of Loos.—In reply to Mr. Pringle, who asked for official figures of the casualties in the battle of Loos, Mr. Tennant said that it was not possible to define with geographical exactitude the area within which the operations that had been called the battle of Loos took place, nor to divide the casualties occurring in them with precision from those arising from simultaneous operations on other adjacent parts of the front. The figures for the period from September 25th to October 8th, 1915, for all the fighting on the Western front were:

	Officers.	Other Ranks.
Killed...	773	10,345
Wounded	1,288	38,095
Missing	317	8,848
Total	2,378	57,288
	59,666	

These figures included the returns from the regular Army and Territorial Force, the Overseas contingents, and the Indian native forces.

Military Hospitals and Asylums.—In reply to Mr. King, Mr. Brace (Under Secretary, Home Department) said on January 5th that ten asylums in England and Wales and isolated parts of two others had been placed at the disposal of the War Office for use as hospitals, and accommodation had thereby been provided for over 14,000 sick and wounded soldiers. Arrangements were in contemplation for converting into hospitals two more asylums. In addition an asylum which at the outbreak of war was nearly completed but not yet occupied was taken over by the War Office, and a similar course would be adopted with another new asylum now approaching completion. Nearly all the civilian patients displaced by these arrangements had been distributed over the remaining asylums, with the result that most of these asylums had at present more inmates than would be considered advisable by the Board of Control in normal times. Every effort was being made to minimize the inconveniences of the arrangement, which was only justified by the exceptional circumstances of the present time.

Antityphoid Inoculation.—Mr. W. Thorne asked the Under Secretary of State for War, on January 10th, for figures showing the number of cases of, and deaths from, typhoid fever, showing separately inoculated and uninoculated among officers and men of the British army

in the United Kingdom and in France and Belgium since August 1st, 1914, and the date to which the figures were compiled. Mr. Tennant said: The figures I have cover the period from the commencement of hostilities to November 10th. During this period 1,365 cases of enteric fever were reported as having occurred amongst the British troops in France and Belgium; of these, 1,150 cases have been definitely diagnosed after bacteriological examination. In 579 cases where there had been inoculation there were 35 deaths, and in 571 cases where there had not been inoculation there were 115 deaths. In the United Kingdom from August 1st, 1914, to October 30th, 1915, 540 cases of enteric fever were reported and 87 deaths; 39 per cent. of these cases occurred in men who had not been inoculated, but I cannot say how the deaths were distributed amongst the inoculated and uninoculated respectively. For paratyphoid no system of inoculation has yet been adopted.

Employment for Wounded and Discharged Soldiers.—Several questions have been asked recently in the House of Commons with regard to the steps that were being taken to organize a national system for training wounded and discharged soldiers and sailors for trades or occupations, and providing employment for them. Mr. Tennant has stated that men discharged from the army were invited to register at a Labour Exchange if they desired assistance in obtaining employment. The number of men so registered who had been placed in employment was so large that the openings for partially disabled discharged soldiers either in situations or in institutions where training was given were in excess of the number of men eligible to fill them. Mr. Tennant has also pointed out that one of the duties of the Statutory Committee, set up under the Naval and Military War Pensions Act, will be to make provision for the care of disabled officers and men after they have left the service, including provision for their health, training, and employment. The Committee would lay proposals before the Government, and, before formulating them, would consult all persons or bodies capable of rendering effective assistance.

Soldiers Medically Unfit.—Major Glazebrook, in a question on January 10th, asked if men known to be medically unfit were often retained with their units for a considerable length of time before receiving their discharge, and asked whether steps would be taken to accelerate discharge and save upkeep, and so increase the productive power of the country by returning them to their civilian occupations. He also asked whether instructions would be given in the case of groups shortly to be called up to reject without delay after a thorough medical examination those whose fitness was doubtful. Mr. Tennant said that it was obviously desirable to discharge from the army any men permanently unfit, and the Army Council was doing all that it could in that direction. Arrangements had been made for groups of men called up to be examined without delay as to their fitness by special recruiting medical boards, which would not pass or reject any man without a most thorough examination. Mr. Rowlands, by a supplementary question suggested that before a man was discharged to go to the munition works he might be kept for as long as two or three months, but Mr. Tennant did not agree that any specific time could be mentioned.

Sickness in Training Camps.—Sir E. Cornwall asked a question, on January 10th, as to sickness among troops in the Salisbury Plain district since the beginning of September, and whether, in view of the reports as to the condition of the camps, a small committee of the House could be appointed to visit them and report whether improvements were possible. Mr. Tennant, in reply, said that for the period September 1st to December 31st, 1915, the annual ratios per 1,000 for the Salisbury Plain district were: Admissions, 325.4; deaths, 1.88. As both these ratios were lower than those for peace time, he did not think there was any necessity for the appointment of a committee.

Night Noises in London.—On January 6th Commander Bellairs asked the Under Secretary for the Home Department whether, in view of the many sick, wounded, and convalescent soldiers now in London, he would take steps to reduce the noises of London after 9 p.m. Mr. Brace, in his reply, said that most of the noise of London was due to the circulation of traffic, and could not be satisfactorily dealt with. Legislation would be required to restrict the whistling for taxicabs, but it was hoped that the publicity given to the matter and the good sense of the public would render such legislation unnecessary.

Duty on Alcohol for Medicinal Purposes.—Sir Philip Magnus asked the Chancellor of the Exchequer, on January 11th, what steps he had taken, or proposed to take, to give effect to his promise to remove the duty on alcohol used for medical or surgical purposes in hospitals. Mr. McKenna replied that it was proposed that the relief should take the form of grants from public funds. A committee had been appointed to advise as to the basis of such grants, and would report as quickly as possible.

Potash Salts.—On January 10th, in reply to Mr. Peto, who asked whether any steps were being taken to revive the industry of kelp burning in this country with a view to rendering agriculture less dependent on the importation of potash salts from Germany, the Parliamentary Secretary to the Board of Agriculture said that careful inquiries were made last winter as to the supplies of different kinds of seaweed on the coasts of England and Wales, but the results showed that there was no sufficient supply of seaweed suitable for kelp-making to encourage the Board to proceed further.

Vaccination in Ireland.—In reply to Mr. Patrick Meehan, on January 6th, Mr. Birrell said that he did not think there was any general demand at present for legislation with regard to vaccination in Ireland.

OUR BELGIAN COLLEAGUES AT HOME AND ABROAD.

DURING the Christmas vacation a number of Belgian pharmacists took advantage of a class arranged by the Pharmaceutical Society of Great Britain for instruction in English methods of dispensing and in the reading and translation of English prescriptions. The class, which was entirely gratuitous, lasted from 10 to 4 daily. Professor H. G. Greenish conducted the practical dispensing and Mr. H. S. Phillips the reading of prescriptions. We are glad to learn that the instruction given was much appreciated by the pharmacists who attended, Professor Greenish and Mr. Phillips being repeatedly thanked for the trouble they had taken in making and carrying out the necessary arrangements.

THE WEEK'S SUBSCRIPTIONS.

The subscriptions to the Belgian Doctors' and Pharmacists' Relief Fund received during the week have been as follows:

	Rs.
B.M.A., South India Branch (per Captain A. J. H. Russell, I.M.S., Hon. Treasurer)—	
Dr. Mary Alexander	15
Dr. Margaret McNeil	15
Major Chalmers, I.M.S.	50

Subscriptions to the Fund should be sent to the Treasurer of the Fund, Dr. H. A. Des Voeux, at 14, Buckingham Gate, London, S.W., and should be made payable to the Belgian Doctors' and Pharmacists' Relief Fund, crossed Lloyds Bank, Limited.

THE late Brigade Surgeon Lieutenant-Colonel Joseph Fleming, M.D., F.R.C.S., Army Medical Staff, of Castlequarter, Inch, co. Donegal, left unsettled personal estate in the United Kingdom valued at £20,316.

ON December 22nd, 1915, Dr. T. J. Walker, of Peterborough, who completed his eightieth year in August, was presented with his portrait in oils, painted by Mr. Fiddes Watt, A.R.S.A. Its cost had been subscribed by 700 friends and neighbours. The presentation was made at a public meeting presided over by Mr. G. C. W. Fitzwilliam, and an address was given by Bishop Clayton. The gift was acknowledged in suitable terms by Dr. Walker, who referred with particular pleasure to the fact that among the contributors were forty ladies who had been nurses in the Peterborough Infirmary, with which he has been so long connected.

THE WAR.

THE PROBLEMS OF MEDICAL EDUCATION IN AUSTRIA AND GERMANY.

VIENNA.

IN his opening address to students at the beginning of the winter session in Vienna, Professor Julius v. Hochenegg[1] delivered himself of some scathing remarks to his much reduced audience, which consisted largely of women students. In the previous academic year he had refused to lecture, and he said that it was with great reluctance that he foresaw having to give certificates of attendance to members of his class in this academic year. At the present time, when the great majority of students were fulfilling their duties in the field, and when only a negligible minority, consisting of the medically unfit and women, constituted his audience, he thought the wisdom of giving lectures was questionable.

The Government's Views on Medical Education.

He went on to say that when, in the autumn of 1914, soon after the outbreak of the war, the Austrian authorities decreed that the work of the University of Vienna should continue uninterrupted in every faculty, he had expressed his doubts as to the wisdom of giving clinical lectures, but he favoured the continuation of instruction in the first years of the medical curriculum. It was pointed out to him that the German universities had not discontinued their clinical teaching, and this example was followed by practically all Professor Hochenegg's colleagues, who continued lecturing in the winter term of 1914–15. The difficulties he had foretold became manifest, and the number of students was indeed so small that it was decided for the summer term of 1915 that only one course of lectures should be given on each subject. At a recent meeting of the College of Professors it was decided, in view of the Government's order, that clinical lectures in surgery should be given in Professor Hochenegg's hospital for the winter session. He had therefore to bow to this decision, but he did so under protest.

Military Hospital Work in Vienna.

Since the middle of August, 1914, his hospital had been devoted almost exclusively to the wounded, only two of his eight wards being reserved for civilians. Subsequently accommodation had been found outside his hospital for the wounded under his care, so that the number of beds devoted to the wounded was raised to 492. Before the outbreak of the war his staff consisted of six assistants, two demonstrators, and fourteen operating pupils. At the outbreak of the war he was left with only one assistant and three operators. With this much reduced staff he was expected to do the impossible and he did not see how, in addition to all the new tasks imposed on him by the war, he could find time for clinical teaching. He could not follow the example of the German universities, where professors engaged in war work had delegated their teaching duties to their assistants. To follow this course in Austria would mean the recall from active service of his assistants, whose services in the field were indispensable.

The Anomaly of Teaching the Unfit War Surgery.

His male audience consisted exclusively of persons rejected for military service. For them only the surgery of peace time was of interest, and, owing to the war, he had not the necessary material on which to base instruction in peace surgery. The thought of using wounded soldiers as object lessons for his students was repugnant to him; for many soldiers the demonstration and discussion of their wounds would be most distressing. Indeed, the pain of these wounds and the risk of infection would in most cases contraindicate their handling by students. Again, the delicate, complicated operations referred to his hospital, including suture of blood vessels and nerves, extractions of deep-seated projectiles, plastic operations, etc., were unsuited for operative demonstration. Merely to look on at such operations afforded little instruction. The conditions for satisfactory clinical instruction were, therefore, wanting for pupil as well as teacher. The present stirring times created an atmosphere of unrest which was fatal to mental concentration. It would therefore be misleading for him to issue certificates of attendance at the end of a session during which the acquirement of knowledge must necessarily have been below normal. With the war dragging on, it was possible for students to present themselves for examination whose instruction in surgery had exclusively been given under war conditions. It was obvious that their knowledge of surgery must under such conditions be very imperfect.

The Present and Future Supply of Medical Men.

In opposition to these views it has been urged that the war would greatly reduce the number of doctors, and that the gap thus formed would have to be filled. But neither the State nor the individual patient would be well served by ill-trained makeshifts. Indeed, it was not absolutely necessary at once to replace the medical men who had fallen. Before the war practically all the Austrian universities were complaining of a glut in the medical profession, and measures for the limitation of the number of medical students were under discussion. Professor Hochenegg considered that the over-production of the past years would be sufficient to cover the losses of the war. The present number of students was so small that it was negligible as a stop-gap, and this was an additional reason for not encouraging their hasty qualification. During this lengthy war the public had learnt to limit their medical requirements.

Conditions of Medical Practice after the War.

He anticipated that many doctors returning from the front after the war would experience difficulty in regaining their practices. Many would have to start life afresh, for they would find a practice, built up by patient work, lost to them. By teaching the medically unfit stay-at-home, and granting him a medical diploma, harm would be done not only to the medical student in the field, but also to the doctor on active service. Though he was opposed to conferring any benefit on the stay-at-home at the cost of the absentee, he was loth to count medical service in the field as a substitute for training at home; to shorten the medical curriculum, already reduced to a minimum, in this way would, in his opinion, be impossible. In Germany, where the medical curriculum had for a long time included a year of practical work, it was possible to count medical service in the field in this year.

The Duty of the Unfit Medical Student.

He advised his audience to volunteer their services in the many hospitals which were short of doctors and nurses. There they would learn much more than by attending his faulty and improvised lectures. As a student he had spent nine months helping surgeons in the Bosnian campaign; and he was convinced that this experience was the starting-point of his career as a surgeon. Similar experience was now being gained by medical students, male and female, in the present war. About 50 per cent. of the students wishing to attend lectures for the winter session were women. He would like to see nursing made compulsory for women. When he expressed this opinion some years ago it had aroused much opposition on the part of the other sex, notably women doctors. He did not, however, think that the most sensitive of women would be outraged by his objecting to helping the woman student at the cost of the absent male student. His advice to his audience—that they should go and work in the hospitals rather than attend lectures—was meant to include both sexes. In conclusion, he told those students who failed to follow his advice, and insisted on pursuing their studies and attending his lectures instead of caring for the sick and wounded, that they would find him an exacting and relentless examiner at the end of the term.

URGENCY MEDICAL DIPLOMAS IN GERMANY.

We have already referred[2] to the steps taken by the German Government at the outbreak of the war to provide an additional number of medical men by granting special facilities to senior medical students. This action appears to have been ill considered and the result of a panic in the Government, which did not allow itself time to consult the medical profession. The Government's action involved the

[1] *Wien. med. Woch.*, November 13th, 1915.

[2] BRITISH MEDICAL JOURNAL, March 6th, 1915, p. 435, and April 17th, 1915, p. 691.

suspension of the "practical year" in the medical curriculum. Between August 6th, 1914, and March 31st, 1915, medical diplomas were granted to 1,273 medical students on urgency or war terms. The average number of medical diplomas granted every year in the period 1908–1914 in Prussia was 625. Had it not been for the war about 745 diplomas would have been given in Prussia, whereas 1,568 were actually given, this number including the medical students who had qualified under ordinary conditions. For the whole of Germany the number of diplomas given for the two years preceding the war were 1,232 and 1,447 respectively, whereas the figure for the last academic year was 3,747. An examination of the statistics for the various German universities before and during the war shows that the standard of efficiency has in many cases been so much reduced by the war that 100 per cent. of the candidates for diplomas satisfied the examiners. For the period 1908–14 only 89 per cent. of the students in Prussia satisfied the examiners. The Bavarian War Office has recently granted furlough to medical students in the field eligible to enter for examinations; the furlough was limited to the period of the examination, and did not include time for study.

BOOTS AND GAITERS.

"GAITER PAIN."

IN a reserve hospital for officers in Neuhaus, Schüller[1] observed a number of cases in which the main symptom was severe pain over the tibiae. This symptom, to which he applied the term "gaiter pain," was usually unaccompanied by other symptoms, although occasionally pain in the knee and ankle joints was present also. The pain was bilateral, and, as a rule, equally intense on both sides. It was a tearing or dragging pain, which made itself felt at rest, but which was increased by movements of the legs to such an extent that the patient sometimes could not remain standing. The tibiae were not tender when pressed or struck, there were no abnormalities of the skin, joints, nerves, or muscles, there were no other sensory disturbances, and the cutaneous and tendon reflexes were unaffected. Schüller associated this condition with the wearing of leather gaiters or similar contrivances, but he avoided committing himself to a diagnosis by using the evasive term "gaiter pain."

Kronfeld,[2] who was attached to an infantry division, states that during the first six months of the war he frequently had the opportunity of observing this condition. The patients usually complained of unbearable "rheumatic pains" in the legs. He was dissatisfied with this diagnosis, but could suggest no alternative. The one to two hundred men suffering from this complaint were much overworked, and naturally anxious not to minimize their symptoms. At this time the claims on the army doctors were so numerous that it was impossible to individualize; and to have put all these men on the sick list would have brought trouble on the head of the certifying doctor. Accordingly, when drugs and other measures failed to banish this symptom, treatment by suggestion and other less gentle methods were applied. Though this Spartan procedure satisfied the authorities so long as the cases were sporadic only, it was neither justifiable nor adequate when the cases increased in number and severity as a result of the winter campaign in the Carpathians. Many cases of frost-bite were observed, but were quite unmistakable and distinct from cases of "gaiter pain."

Dr. Kronfeld observed two cases, which were peculiarly instructive, as he was able to follow them closely. One patient was an infantry officer, who was much debilitated by overwork. Otherwise he was perfectly well, and his limbs had in nowise suffered from frost-bite. The "gaiter pain" in his case could not be altogether dissociated from a history of syphilis. The other patient was a robust, industrious peasant soldier. For weeks he continued to make the same complaints, but repeated examination failed to show anything amiss. Salicyl, quinine, aspirin, embrocations, and massage all proved futile. At last malingering was suspected and, in spite of his complaints of pain, the patient was put on sentry duty. When Dr. Kronfeld inspected the sentries one cold and stormy night he found the patient at his post lying in the snow, whimpering and groaning with pain. The patient was obviously not a malingerer. He was relieved of duty, and a neurologist, who examined him subsequently and learnt that the patient had been somewhat feverish a little earlier, came to the conclusion that he was suffering from post influenzal neuritis. Both these patients had worn for months the regulation gaiters, and both cases were typical examples of "gaiter pain."

[1] *Wien. med. Woch.*, August 28th, 1915.
[2] Ibid., October 16th, 1915.

THE FOOT-WEAR OF THE AUSTRIAN SOLDIERS.

In the course of fourteen months' war, Dr. Kronfeld had travelled about 1,600 kilometres, some 1,200 of which he had walked. This experience had taught him that the best foot-gear was the heavy, hobnailed, watertight laced boot familiar to every tourist and alpine climber. The hobnails were clipped round the margins of the sole, and could not easily fall out. He wore two pairs of socks, and swathed his legs in coarse woollen cloth. To prevent moisture escaping down the tops of his boots he used a strap of cloth or leather, 60 by 10 cm., such as is familiar to every patron of "ski." He had little good to say of the Wellington boots worn by the Austrian sappers and pioneers. The high boots worn by the German "musketier" were no doubt in many respects useful in the bottomless mud of the Russian roads, but they kept out too much air and were difficult to pull off and on, particularly when wet. In his opinion the foot-gear of the Austrian infantry left much to be desired.

CASUALTIES IN THE MEDICAL SERVICES.

ARMY.

Died of Wounds.

LIEUTENANT OSCAR GLADSTONE MAGINNESS, R.A.M.C., died of wounds in France towards the end of December. He was educated at St. Bartholomew's Hospital, and took the diplomas of M.R.C.S. and L.R.C.P.Lond. in 1913. Previous to the war he was serving in H.M.'s dockyard at Pembroke Dock. He took a temporary commission as Lieutenant from March 27th, 1915.

Died on Service.

Captain William Ernest Rielly, R.A.M.C.(T.F.), died at the Dardanelles on November 28th, 1915. He was educated at University College, London, and took the diplomas of M.R.C.S. and L.R.C.P.Lond. in 1891, and the degrees of M.B. and B.S.Durham, and the D.P.H.Camb. in 1894. After qualifying he acted as house-physician of the Consumption Hospital, Brompton, and prior to the war was in practice at Barnes. He served in the South African war, and held the Queen's medal with four clasps. He had the rank of honorary Lieutenant in the army, and a commission as Captain in the Territorial Force Reserve of the 3rd Battalion London Regiment from March 27th, 1901, but was transferred to serve as Captain and medical officer of the same battalion from September 26th, 1914.

Wounded.

Captain T. W. Wylie, R.A.M.C., Special Reserve (France).

Captain R. E. Walker, R.A.M.C., temporary (France).

Lieutenant G. A. Birnie, R.A.M.C.(T.F.), (France).

Lieutenant A. Wylie, R.A.M.C., temporary (Mediterranean).

Lieutenant L. A. C. Panton, R.A.M.C., temporary (Captain Canadian Army Medical Corps), (Mediterranean).

Lieutenant M. B. Swan, R.A.M.C. (temporary), France.

MEDICAL STUDENTS.

Lauder, Stanislas, Private 14th (London Scottish) Battalion London Regiment, killed in France on October 13th. He was a medical student at the London Hospital, and had passed all his examinations except the final. He served in the Turco-Italian war under the Turkish Red Crescent in Tripoli, and subsequently in a similar capacity in Montenegro in the late Balkan war. He took part in an attack by his regiment on October 13th, was severely wounded while giving surgical assistance to other wounded men, and died while being conveyed from the advanced dressing station to the field ambulance.

Sturridge, Ernest Arthur Leland, Second Lieutenant 8th Battalion King's Own Yorkshire Light Infantry, son of Mr. Ernest Sturridge, of 29, Wimpole Street, and Brondesbury, was recently killed in France. He was a medical student at University College Hospital, where he was prominent in Rugby football and in athletics. He got his commission in the 11th Battalion of the K.O.Y.L.I. on October 3rd, 1914.

DEATHS AMONG SONS OF MEDICAL MEN.

Darbishire, Arthur Duckinfield, Private 15th Battalion Argyll and Sutherland Highlanders, was removed from Gailes Camp, Irvine, to the Kaimshill Hospital, Kilmarnock, on January 2nd suffering from cerebro-spinal meningitis, and died the same day, aged 36. He was a son of the late Dr. S. D. Darbishire, and was born at Oxford in 1879, and educated at Balliol College, taking the M.A. at Oxford with honours in zoology. He subsequently filled posts in the Museum, Oxford, in Manchester University, and in the Royal College of Science, South Kensington. In 1911 he was appointed lecturer on genetics (evolution and heredity) in Edinburgh University. In July, 1915, he enlisted in the 14th Battalion Argyll and Sutherland Highlanders, being transferred later to the 15th Battalion. We understand that he had been recommended for a commission, which he would shortly have received.

Gribbon, Montague Claude, Captain 67th Punjabis, youngest son of the late Lieutenant-Colonel G. C. Gribbon, R.A.M.C., was killed in Mesopotamia on December 9th, aged 31. He was reported at first as wounded and missing, afterwards found killed. He was born on May 9th, 1884, joined the army on January 21st, 1903, and the Indian army on April 10th, 1904, and was promoted to Captain on January 21st, 1912. He served on the North-west frontier of India in the operations in the Mohmand country in 1908, receiving the frontier medal with a clasp.

White, Leonard Hale, Lieutenant R.N., second son of Dr. Hale White, Physician to Guy's Hospital, killed by the explosion on board H.M.S. *Natal* on December 30th, 1915, aged 26. He was educated at Pretherne House and Bradfield College, and passed into the *Britannia* in July, 1904. On completion of his training he went for a cruise in the *Isis*, serving subsequently on the *Majestic*, *Venerable*, *Implacable*, T.B. 18, *Erne*, *Prince of Wales*, and *King Edward VII.* While in the last ship he formed one of the international landing party which, under Sir Cecil Burney, went to Scutari in 1913. After his return he went through the gunnery course at Whale Island. When the present war broke out he was appointed to command the *Panther*, but was gazetted to the *Tiger* in September, 1914, and was severely wounded in the battle of the Dogger Bank in January, 1915. On his recovery he rejoined the *Tiger*, and served in that ship till December 16th, when he was appointed gunnery lieutenant of the *Natal*, which he joined on December 23rd, only seven days before the fatal explosion.

Combatant Officers Killed.

The list of medical men killed whilst serving as combatants, published in the JOURNAL of December 25th, has been revised and is printed at p. 94. We shall be glad to receive information regarding any whose names have been omitted. A name given for the first time this week is that of Dr. E. M. Ridge.

Edwyn Manners Ridge was born at Enfield in 1877, the son of the late Dr. J. J. Ridge, and was educated at Mill Hill School and at the London Hospital; at both he was well known as a Rugby football player. He took the diplomas of M.R.C.S. and L.R.C.P.Lond. in 1900, and after serving as house-surgeon at the London Hospital, and as prosector to the examining board of the Royal College of Surgeons, took the F.R.C.S. in 1902. He subsequently filled the posts of assistant house-surgeon at the Poplar Hospital for Accidents and assistant medical officer at Hoxton Asylum, and also held ophthalmic appointments at the London and Royal Western Hospitals, and served as assistant to his father at Enfield. On his father's death in 1908 he continued the practice in partnership with his brother, Dr. R. L. Ridge. In 1911 he joined the Royal Naval Volunteers Reserve as a Sublieutenant; in August, 1914, he was called out for service, accompanied the expedition to Antwerp on October 6th, 1914, and was killed in action there three days after his arrival. The thought cannot but occur that his death in action, though he fell gallantly doing his duty in the service of his country, was a waste of his scientific skill and knowledge, which might have been utilized to better purpose. He leaves a widow and a posthumous son.

LOST AT SEA.

The P. and O. ss. *Persia*, 7,974 tons, Captain W. H. Hull, which left London on December 18th, and Marseilles on December 26th, with the mails for the East, was torpedoed on December 30th off the south coast of Crete, and sank in five minutes, with great loss of life. She had on board 184 passengers and a complement of 317, total 501, out of whom only 166 (crew 101, passengers 65) were saved, and 335 lost. Among the passengers were two lady doctors—Miss Cook, who was saved, and Miss Impey, who was lost. The surgeon of the ship, Dr. Everett, was also among those lost.

Dr. William Everett was educated at Edinburgh University, where he took the degrees of M.B. and C.M. with honours in 1889, and the M.D. in 1893, subsequently filling the post of senior assistant medical officer in the Kent County Asylum at Chartham. His address is given in the *Medical Directory* as the Headlands, Kettering, Northants.

Miss Elizabeth Stephens Impey was educated at Birmingham University, where she took the degrees of M.B. and Ch.B. in 1911. Afterwards she acted successively as house-physician of the General and Eye Hospital, Swansea, house-surgeon to the Birmingham Maternity Hospital, and to the Birmingham Children's Hospital, and resident surgical officer of the London Temperance Hospital. She had just joined the medical service of the Dufferin Fund in India, and was going out to take charge of the Lady Dufferin Hospital for Women at Lahore. She was the eldest daughter of Mr. Frederick Impey, J.P.

NOTES.

SUVLA AND ANZAC.

IN his dispatch dated December 11th, 1915, issued by the War Office on January 6th, 1916, Sir Ian Hamilton makes the following reference to the work of the Army Medical Services:

A feature of every report, narrative, or diary I have read has been a tribute to the stretcher bearers. All ranks, from generals in command to wounded men in hospital, are unanimous in their praise. I have watched a party from the moment when the telephone summoned them from their dug-out to the time when they returned with their wounded. To see them run lightheartedly across fire-swept slopes is to be privileged to witness a superb example of the hero in man. No braver corps exists, and I believe the reason to be that all thought of self is instinctively flung aside when the saving of others is the motive.

LORD FRENCH'S DISPATCH.

Professor Dixon, of Trinity College, Dublin, forwards the following names of members of that school mentioned in Lord French's dispatch of November 30th, in addition to those already noted under the medical services:

Panter, George William, Second Lieutenant 1st Battalion Royal Irish Rifles, third year medical student.

Colhoun, William Albert, Captain 4th Battalion Royal Irish Fusiliers, fourth year medical student.

Brook, Rev. Thomas, M.D., B.D., LL.D., Chaplain to the Forces, third class.

LOSSES AMONG GERMAN AND AUSTRIAN MEDICAL MEN.

In the *Morning Post* for December 29th, 1915, a report was published from its correspondent in Budapest dealing with the official casualties in the German and Austrian army medical services from the outbreak of the war till November 1st, 1915:

Germany.		*Austria.*	
Killed...	96	Killed...	101
Wounded	373	Wounded	315
Died of infectious disease	707	Died of infectious disease	971
Prisoners	215	Prisoners	331
Total	1,391	Total	1,718

Grand total for Germany and Austria ... 3,109

These figures were given as official during a debate in the Hungarian Parliament. The deaths from infectious diseases appear to have been largely due to epidemics of cholera and typhus. The complaint was made in the Hungarian Parliament that promotion for Hungarian military doctors was too slow; it was said also that not a single professor in Budapest or Vienna, whose services had not been requisitioned, had volunteered for work at the front.

The total loss in the medical service of the German army down to September 22nd, 1915, was recently (see BRITISH MEDICAL JOURNAL, December 4th, 1915, p. 838) stated as 1,027.

GERMAN RED CROSS AND NEW HOSPITALS.

The Central Committee of the German Red Cross has addressed a communication to the management of the International Hotel Owners' Association in which the foundation of special convalescent homes and new institutions for the wounded is discouraged. It appears from this communication that many of these pseudo-philanthropic concerns have been erected and equipped by speculators. The communication proceeds: "The convalescent homes are undesirable for social, political and economic reasons. It is well known that many German baths and therapeutic establishments are hard hit by the war, and that many hotel owners are faced by economic ruin. It seems, therefore, unwise to create a new competitive factor and thus further to injure, however unintentionally, these interests by charitable collections. It is also undesirable to herd the sick, particularly elderly people of good family, in special institutions reminiscent

of barracks. It is not necessary to found societies for the care of combatants. Steps have already been taken to guard the interests of discharged soldiers requiring treatment and unprovided or insufficiently provided for by the military or insurance authorities. Arrangements have been made for the care of invalids in the various institutions and baths on cheap, satisfactory, and discriminating terms, which could not be secured either by new societies or by private persons."

Medical Officers Wanted.

2/1st Highland Mounted Brigade Field Ambulance.

Three medical officers urgently required for the 2/1st Highland Mounted Brigade now sending drafts of officers and men overseas, one regimental medical officer for the 2/2nd Lovat Scouts, and two for the 2/1st H.M.B. Field Ambulance. Full particulars of pay and duties from Captain Mowat, Officer Commanding 2/1st H.M.B.F.A., 2, Mount Street, Diss, Norfolk.

2/1st South-Eastern Mounted Brigade Field Ambulance, R.A.M.C.(T.F.).

Three medical officers are urgently required by this unit. They must be willing to take the Imperial Service obligation. Full particulars as to pay and allowances on application to Major Hamilton, Officer Commanding, 2/1st South-Eastern Mounted Brigade Field Ambulance, Cricket Ground, Canterbury.

2/2nd South Midland Mounted Brigade Field Ambulance.

Medical officers are urgently wanted for this unit, at present stationed at King's Lynn. They must be prepared to sign for foreign service. Applications to Major A. G. Magrath, Officer Commanding 2/2nd South Midland Brigade Field Ambulance, London Road, King's Lynn.

England and Wales.

After-Care of Consumptives.

Mr. J. Redman Ormerod, Vice-Chairman of the Lancashire Insurance Committee, in a letter to the *Manchester Guardian* draws attention to the fact that the Commissioners have decided, in response to representations, to abolish district insurance committees in the Lancashire area, but contends that it is desirable to have some bodies to take up some of the work of the district committees, especially so far as it related to the after-care of consumptives who have been discharged from sanatoriums. The district committees were undoubtedly hampered by two circumstances. In the first place, many of them had charge of areas so wide that it was almost impossible for them to keep in touch with the individual cases of tuberculosis, or, as Mr. Ormerod puts it, "local touch was lost, and local knowledge of and interest in cases was virtually impossible." In the second place, the powers of the district committees were, perhaps unavoidably, very restricted, and the constant reference that had to be made to the county committee was so irksome that the members of the district committees lost much of their interest in their work, and little of any practical value was done by them in Lancashire. Mr. Ormerod goes on to suggest that a better arrangement would be to make the after-care of consumptives the business of the various local health authorities which exist in every urban and rural area, with the addition to each such local body of direct and adequate representation of insured persons. Apparently Mr. Ormerod only includes under the term "after-care" the provision of such conditions of home life and employment as will help to make permanent a cure commenced in a sanatorium, the Insurance Committee continuing, as at present, to be responsible for sanatorium treatment and apparently for all treatment of cases not sent to sanatoriums. But it must be obvious that a considerable number of persons discharged from sanatoriums will continue afterwards to require medical treatment at home, and Mr. Ormerod does not clearly state whether he would have such medical treatment given by the Insurance Committee, as at present, or by the amplified local health authority. If the health authority is to give such medical treatment, then we should have two separate bodies giving treatment to the same person at different periods of his disease, and there would be an inevitable tendency for each body when short of funds to attempt to shift the responsibility to the other. On the other hand, if the local health authority is not to give medical treatment as part of its after-care, but to confine itself to providing proper home surroundings and suitable employment, it is difficult to see any advantage over a properly arranged system of district insurance committees. Moreover, there is one advantage which the district insurance committees have which would be almost entirely lost on Mr. Ormerod's suggestion—namely, the co-ordinating and correlating influence of the County Insurance Committee. It cannot be said that the small urban and rural health authorities have in the country generally reached anything like a satisfactory state. They are too often ruled by petty local interests and by men who, with little or no knowledge of what should be included under after-care, would refuse to be guided by a few representatives of the insured. Anything like proper co-ordination of their work by the county councils has in practice always been beset with difficulties. On the other hand, the County Insurance Committee has full power to co-ordinate the work of its district committees, and in nothing is such co-ordination more important than when the difficult question arises of finding suitable employment for considerable numbers of convalescent consumptives. Mr. Ormerod agrees, "to a certain extent," that the idea underlying the formation of district insurance committees was a good one. So far it has not had a fair trial, and though in some parts of the country, such as Lancashire, the practical working has not been good, there is even less ground for believing that local urban and rural health authorities have as yet shown themselves satisfactory bodies for taking over a duty which every Insurance Committee out to carry out.

Ireland.

Ulster Medical Society.

The second general meeting of the society was held in the Medical Institute, Belfast, on January 6th. Dr. T. A. Davidson, vice-president, occupied the chair. Three new Fellows and three new members were elected.

Dr. Calwell gave notes of a case of polycythaemia in a woman, aged 43. The extremities were deeply cyanosed; she was emaciated, there was some ascites, and the spleen extended 2 in. below the costal margin. The red corpuscles numbered 7,000,000, the white 16,000; a differential count showed 82 per cent. of polymorphonuclear and 16 per cent. of large lymphocytes. The abdomen was tapped to relieve the breathing, and friction was found over the spleen and in both pleurae; the heart showed enlarged right ventricle and deficient and fixed apex beat. The most probable diagnosis was a polyserositis with chronic indurative pericardio-mediastinitis. Dr. Darling (Lurgan) reported 8 cases of Caesarean section with survival of 7 mothers and 7 children. He emphasized the necessity of doing primary section, and not wait until the uterus had become contaminated by repeated vaginal manipulation. Dr. John Campbell, Sir Alex. Dempsey, Dr. Hicks, Dr. R. J. Johnstone offered remarks, and agreed with the main points in Dr. Darling's paper. Mr. Howard Stevenson read a paper on the open method of treatment of fractures, illustrated by a series of lantern slides. He showed the advantage of bringing the ends into apposition, and the impossibility of doing so merely by splints.

Instruction of Crippled Soldiers in New Trades.

It has been decided to open a dépôt for 4,000 wounded Irish soldiers in Tipperary, to which men of the eight Irish regiments are to be sent for post-hospital treatment, on the completion of which they will either return to service or be discharged from the army. Many of these men are unable to take part in the usual outdoor recreations, and in a large number of cases will be unable to return to their occupations. It has been decided to institute elementary instruction in wood and metal working, typewriting, and telegraphy. The Joint Technical Instruction Committee of Tipperary has been asked to co-operate in this work. There are two very fine classrooms in the Central Technical School which at certain hours are unoccupied, and the Committee has unanimously decided to grant every possible facility to the military authorities in the matter.

Irish War Hospital Supply Dépôt.

The financial statement read to a recent meeting of the Executive Committee of the Central Irish War Hospital Supply Dépôt showed that it was receiving substantial public support

Rules for the affiliation and guidance of sub-dépôts were approved.

The Committee of the Irish Farmers' Gift Day has allocated the sum of £250 for the supply of surgical dressings, and the dépôt staff will be kept busy for the next few weeks in getting these supplies ready for dispatch to the Near East. The first consignment has been already sent off, in a large lorry load of strong packing cases and bales, representing two weeks' work of voluntary lady workers. The dépôt is now in full working order, seven large workrooms being used by the volunteers, of whom about 350 have already registered.

Scotland.

PROVISION FOR DISABLED SOLDIERS IN SCOTLAND.

THE Scottish scheme for providing permanently for soldiers disabled in the war has advanced another stage towards realization. As was stated in the JOURNAL for November 20th, 1915 (p. 763), the scheme originated with the Scottish Veterans' Garden City Association, and aims at enabling soldiers, whose economic value in the labour market has fallen on account of the loss of a limb or some other disability, to find homes and training in some useful work whereby they may supplement their pensions. The Earl of Wemyss, who presided over a meeting of the Association on January 7th in Edinburgh, explained that the movement was not a charity in the ordinary sense of the word, but was an effort in the direction of allowing maimed men to retain their independence on returning to civil life. It was reported that representative committees had been formed in several of the larger cities of Scotland and even in more distant places (America and India). It was announced that a suitable site was available at Longniddry. The first section of the plan which could now be proceeded with would embrace forty houses and two workshops, and extension could take place later. It was unanimously agreed to accept the offer of ground at Longniddry, and the Earl of Wemyss, Lord Salvesen, and Sir Henry Ballantyne were nominated as trustees.

Canada.

STERILIZATION OF WATER BY ULTRA-VIOLET RAYS.

THE use of ultra-violet rays for the sterilization of water was introduced last summer at the military camp at Niagara with most encouraging result, for not a single case of typhoid fever was contracted at the camp. Eleven cases of the disease occurred, but, without exception, the men had been in camp less than eleven days and had come from places where typhoid was present. The water used at the camp was taken from the Niagara River, which gave the usual counts of 5,000 per cubic centimetre, and frequently contained the colon bacillus in $\frac{1}{10000}$ c.cm., and not infrequently even in $\frac{1}{100000}$ c.cm. After exposure to the ultra-violet rays no bacteria were found in 50 c.cm. of water, but as a precaution two subsequent exposures were made. Chlorination was used before installing the ultra-violet ray, and the high bacterial content of the water made it necessary to use from 1 to 1.4 parts per million, which at times gave an unpleasant taste to the water. Fifteen hundred gallons an hour running past three lamps gave an adequate supply of good water for the camp. The cost of installation was about 20 to 25 cents a head of soldiers in the camp.

THE PATRIOTIC FUND.

During the first year of the war—that is, from September, 1914, to September 30th, 1915, the sum subscribed by the Dominion to the Patriotic Fund for the support of soldiers' families was 5,350,000 dollars—an average of 70 cents a head. This year it is estimated that an average of 1 dollar a head, or a total of 7,500,000 dollars, will be required.

No. 7 OVERSEAS STATIONARY HOSPITAL.

The offer of a stationary hospital for overseas service was made some time ago by Dalhousie University, Nova Scotia, and was accepted recently. The personnel has been recruited from the province of Nova Scotia and the unit is now in training at Halifax. The list of officers, several of whom belong to the medical staff of the university, is as follows: Lieutenant-Colonel John Stewart, of Halifax, officer commanding; Majors E. V. Hogan and L. M. Murray; Captains J. A. Murray, V. M. Mackay, F. V. Woodbury, E. Kirk Maclellan, John Rankin, Kenneth A. MacKenzie, S. J. MacLeod; Lieutenant K. F. Woodbury, dental surgeon; honorary Lieutenant and Quartermaster Walter Taylor; and honorary Lieutenant S. R. Balcom, dispenser. The non-commissioned officers and men have been recruited from all parts of the province, and include a number of students from King's College and the universities of Mount Allison, Acadia, and Dalhousie. An equipment fund has been opened and it is hoped to collect the sum of 12,000 dols.; a committee, of which Dr. G. B. Cutten, President of Acadia University, Dr. H. S. Mackenzie, President of the University of Dalhousie, Dr. B. C. Borden, President of Mount Allison University, are members, has been formed to direct the disposition of the funds subscribed.

Correspondence.

LEPROSY AND LEPER HOUSES.

SIR,—In your interesting review of Dr. Mercier's Fitz-Patrick Lectures, on p. 54, there appears a geographical error which I beg to point out, and which I have corrected in reviewing the same work in another journal. The "Shireburn Hospital in Yorkshire, for 65 lepers," should read the "Sherburn Hospital, Durham," to which institution the description applies. It is true that there was an ancient ecclesiastical foundation at the village of Shireburn, in Yorkshire, but it was only a very small one, and it was not a leper house. This institution, to which I have the honour of being the physician-in-charge, was founded in 1181 as a leper house by Bishop Pudsey. When leprosy died out in England towards the close of the Middle Ages, the hospital was devoted to charitable purposes, and later still the Charity Commissioners reconstituted it into a modern hospital for medical cases, curable or incurable, together with a large out-patient department, at which there are several thousand attendances annually. At the same time the ancient rule of master and brethren still persists, for there is accommodation for 15 "in brethren," aged men of good character who have resided within the diocese of Durham, who are cared for in their declining years. There are also "out-brethren" and "out-sisters," as well as a system of educational scholarships. Thus, the Sherburn Hospital has transformed itself in accordance with the altered conditions of society, so that, as a modern chronicler has aptly put it, "the great traditions of the past can be wisely, happily, and usefully combined with the highest aspirations of the present and future."—I am, etc.,

G. NORMAN MEACHEN.

Sherburn Hospital, near Durham,
Jan. 8th.

STATE REGISTRATION OF NURSES AND THE RED CROSS SCHEME.

SIR,—The letter of Dr. Ferdinand Rees is to the point. The whole future of nursing hangs in the balance. Nothing but the immediate State registration of the fully-qualified nurse can ever safeguard the status of the nursing profession. The danger of the untrained V.A.D. worker should be recognized and met.—I am, etc.,

NEVILLE A. EDDLESTONE.

Whitley Bay, Jan. 9th.

THE TONSILS.

SIR,—In his letter on the question of tonsillectomy, appearing in your issue of January 8th, Mr. William Hill, whilst advocating total removal of the glands as the operation of choice in most cases, states that he, in company with most others, "would hesitate to eviscerate the entire tonsillar bed in trained singers and other professional voice producers, on account of the danger of altering the form and deranging the muscular mechanism of the fauces from post-operative adhesions."

I am not quite clear what Mr. Hill desires to convey by the words "entire tonsillar bed," but from the text presume

he alludes to a clean evisceration of the tonsils, and, if so, I would like to point out that, in contravention to the popular fallacy (both lay and medical) about this matter, I have many times totally removed septic tonsils by the blunt dissection method in professional voice producers, both teachers and trained singers, with the invariable result that not alone were the pharyngeal symptoms removed, but that the patient experienced improvement, and often marked improvement, of the voice.

I am ready to admit that the scar tissue which forms in the interfaucial space subsequent to operation may, in a certain small percentage of cases, give rise to a slight sensation of tightness in the throat, but I have never known this symptom to be complained of for more than six weeks after operation. Further, it is perhaps conceivable that the patient might require a few lessons on the reproduction of his voice when the end-result of operation was apparent, but I have not yet met with such a case.

I therefore feel justified in contending that provided the surgeon possesses the necessary technical experience, and due care be taken to avoid injury to the surrounding tissues, the patient's profession as a voice user is an indication rather than otherwise for the performance of an otherwise necessary tonsillectomy.

With Mr. Hill's other remarks *re* the much debated questions concerning the tonsils I am in thorough agreement.—I am, etc.,

Cork, Jan. 10th. JAMES B. HORGAN.

SIR,—Dr. William Hill's letter invites an answer from me, or rather an amplification of my previous letter.

I mean what I said, "the only operation applicable is enucleation." I do not except trained singers or other professional voice users, for the reason that I have never seen permanent derangement of the muscular movements of the fauces and palate follow a properly performed enucleation of the tonsils. One would, of course, be particularly careful in regard to this class of patient, both in considering the question of operative procedure and in carrying out enucleation; but that is all. It must, too, be borne in mind that in cases of chronic disease of the tonsils, especially in adults, there is a concomitant and dependent thickening of the pillars and firm adhesions between the capsule and the sheath of the constrictor muscle, and while any of the septic tonsil and the capsule remain the movements of the faucial muscles will suffer from these disabilities, together with others, not perhaps of a serious nature, such as mild attacks of pharyngitis and laryngitis. Adults, singers, clergymen, teachers, have told me how less easily their voices get tired, and how much less strain there is in singing or speaking since their tonsils were removed. There is another side to this question, and that is our attitude towards the tonsils in those who propose to have their voices trained. The same rule applies. It is not wise to leave part of a diseased structure in the throat. In this matter of trained voice users I am, I know, up against authority, but I am convinced that with our wider knowledge this question is ripe for reconsideration and discussion.

Dr. Hill then deals very clearly and very fairly with the methods of enucleation. First let me say that I do not approve of the method of removal of the tonsils employed formerly, and even at the present time, by some general surgeons, and commended in Dr. Mechan's paper, though I fancy Dr. Mechan's intention was to insist on complete removal of the tonsils, and not to commend a particular method. "According to general surgical principles," in this as in other special regions, has been used to cover much inferior surgery. It is probable that the introduction of the guillotine in the first instance had a double origin—the disfiguring and mutilating results of the general surgeon and the lack of knowledge of surgical procedure in the specialist.

Our aim being to remove the tonsil complete in its capsule, we should see that this result is definitely attained. To do this in every case some method of dissection is necessary. I am aware that in many cases—indeed, I may even allow that in the large proportion of cases in the hands of experts—some of the newer forms of guillotine may effect it. Where the result aimed at is not thus attained, experts like Dr. Hill will complete the operation by the aid of dissection. The dissection method, indeed, is the sheet-anchor after all. But the danger of the guillotine is—and this is my point—that in the hands of the less expert the incomplete operation of tonsillotomy is perpetuated, though, of course, a tonsillectomy has been performed because an enucleating guillotine was used!

Why, then, use a guillotine at all? The dissection method is simple, can be easily taught, is definite in its result, and can be carried out so expeditiously that I myself almost invariably make use of chloride of ethyl anaesthesia in children. In adults I use either local anaesthesia—with a preliminary hypodermic injection of morphine, omnopon, or some such narcotic—or chloroform. And here let me say that I think there is no need for the dangerously deep chloroform anaesthesia which some operators insist on. The method of enucleation I use is the one of combined dissection and snare. If it is desired to control the haemorrhage before removing the tonsil, the snare can be tightened and allowed to remain for several minutes before cutting through the hilum. In this way the result claimed for the haemostatic guillotine can be obtained.—I am, etc.,

Glasgow, Jan. 11th. W. S. SYME.

The Services.

ROYAL NAVAL VOLUNTEER RESERVE.

PRIZE MONEY.

THE Central Medical War Committee recently addressed an inquiry to the Medical Director, R.N., asking whether Surgeons, R.N.V.R., were entitled to prize money, and, as will be seen from the following correspondence, have received an affirmative response.

December 9th, 1915.

Sir,

At the meeting of the Executive Subcommittee of the Central Medical War Committee held on the 6th inst., we were instructed to submit to you the following questions affecting Surgeons of the Royal Naval Volunteer Reserve, with a request that you would be good enough to supply an authoritative answer which we can give to inquirers:

1. Are Surgeons R.N.V.R. to participate in prize money at the end of the war?
2. If not, are they to receive a bonus at the end of the war?

In regard to this latter question, it is understood that temporary R.N. Surgeons are to have a gratuity equal to two months' pay, and officers of the R.A.M.C.T.F. will also receive a gratuity.

We are, yours faithfully,
N. BISHOP HARMAN,
ALFRED COX,
Secretaries.

Surgeon-General Sir Arthur W. May, K.C.B.,
Director-General,
Medical Department of the Navy,
Admiralty, S.W.

No. 19167. Medical Department of the Navy,
Admiralty,
December 22nd, 1915.

Gentlemen,

I have to acknowledge the receipt of your letter of the 9th instant, and to request you to inform your Executive Subcommittee that Surgeons of the Royal Naval Volunteer Reserve will be treated in the same manner as Surgeons of the Royal Navy in connexion with prize money.

I am, Gentlemen, your obedient Servant,
(Signed) ARTHUR W. MAY,
Director-General.

The Secretaries,
Executive Subcommittee of the
Central Medical War Committee,
429, Strand, W.C.

EXCHANGES DESIRED.

ROYAL ARMY MEDICAL CORPS.

LIEUTENANT in field ambulance in France, owing to impaired health, desires exchange to hospital at home or in France. Address No. 247, BRITISH MEDICAL JOURNAL Office, 429, Strand, London, W.C.

Major R.A.M.C., at present in field ambulance—second line—wishes to exchange. Hospital, field ambulance, or sanitary company going abroad preferred. Has public health qualification. Address No. 249, BRITISH MEDICAL JOURNAL, 429, Strand, W.C.

A captain (Territorial Field Ambulance), at present on sick leave from the Mediterranean, desires to exchange with an officer holding a hospital appointment in or near London. Address No. 250, BRITISH MEDICAL JOURNAL, 429, Strand, W.C.

THE King Edward VII Hospital, Cardiff, has received one thousand guineas from Captain David T. Lewis, R.A.M.C., to endow a bed in memory of his father, the late Alderman Richard Lewis, of Cartref, Pontypridd, vice-chairman of the Glamorgan County Council. In compliance with Captain Lewis's wish the bed will be used for wounded soldiers during the period of the war. The hospital has also received from Messrs. Watts, coal-owners, a donation of the same amount to endow another bed.

Obituary.

SIR FREDERIC WILLIAM HEWITT, KT., M.V.O., M.A., M.D.CANTAB.,

ANAESTHETIST TO H.M. THE KING.

SIR FREDERIC HEWITT, who died at Brighton on January 6th, was the son of Mr. G. F. Hewitt of Badbury, Wilts, where he was born in July, 1857. He was educated at Christ's College, Cambridge, and began his professional career at St. George's Hospital in 1880. He came there after graduating at Cambridge, where he was a popular and successful member of Christ's College. At St. George's, by securing the Brackenbury Prize in Medicine as well as the Treasurer's Prize and by the distinguished manner in which he held various junior posts, he was marked out for more than ordinary success. His interest becoming early engaged in the subject of anaesthesia and an opportunity offering for favourably pursuing this branch of practice, he secured the post of anaesthetist to the London Hospital, which he held for fifteen years, filling during this period similar appointments at Charing Cross Hospital, the Dental Hospital of London, and the National Orthopaedic Hospital. At his old school (St. George's) the post of physician-anaesthetist was instituted in order to regain Hewitt's services, and he was also appointed Emeritus Lecturer on Anaesthetics at the London Hospital.

He made several important contributions to the literature of the subject. The first, a handbook for practitioners and students, entitled *Select Methods in the Administration of Nitrous Oxide and Ether*, appeared in 1888; it was a small but useful treatise. His chief book was *Anaesthetics and their Administration: A Manual for Medical and Dental Practitioners and Students*, which first appeared in 1893, and still maintains its reputation, the fourth edition having been issued in 1912. It is deservedly popular, as the author deals very clearly with the physiological and chemical questions involved. The use of apparatus is also well described. The author spent, he said, ten years in collecting material for this book, which was founded mainly on his own experience. References are relatively scanty but in all cases judiciously selected. Four years later he wrote a highly practical treatise on *The Administration of Nitrous Oxide and Oxygen for Dental Operations*. He urged that safe and thoroughly efficient anaesthesia for dental operations was of such importance that it behoved every dental practitioner to consider carefully whether the crude method of producing insensibility then in vogue should not be abandoned. In its stead, Hewitt urged the employment of his apparatus, which produced an anaesthesia absolutely safe when properly established. No doubt "properly" is a very important qualification; but though Hewitt, like any other experienced author of a book on a practical subject, could not impart his skill to the reader, he never failed to make his principles and practice perfectly clear. In 1889 Hewitt published a useful table showing points to be considered in selection of an anaesthetic, and in 1895 he contributed to Treves's *System of Surgery* an article on anaesthetics.

On December 8th, 1890, Hewitt communicated to the Royal Medical and Chirurgical Society some clinical observations upon respiration during anaesthesia, with special reference to the causes of embarrassed and obstructed breathing, in which he showed the danger of any marked deprivation of oxygen, such as may be caused by the incautious use of bag inhalers, in fat subjects, and persons with weak circulation or disease involving the respiratory apparatus. Temporarily suspended respiration was much less likely to be attended by symptoms of cardiac depression under ether than under chloroform. Hence chloroform was to be avoided wherever a great quantity of the anaesthetic was likely to be needed. In operations on the throat and nose where ether was inadmissible it was, Hewitt insisted, better to induce anaesthesia with A.C.E. mixture or nitrous oxide and ether, and to keep up insensibility with chloroform than to begin with the latter. The A.C.E. mixture, with a free supply of air, was also the best anaesthetic for beginning on a stout, plethoric, or muscular subject, the administrator continuing with ether from an Ormsby's inhaler when the respirations are becoming deep and uncontrolled.

In February, 1899, Hewitt read another communication before the same society on the effect produced in the human subject by the administration of definite mixtures of nitrous oxide and air and of nitrous oxide and oxygen, which led to an interesting discussion. Last March he took part in a discussion in the Section of Anaesthetics of the Royal Society of Medicine on the influence of preliminary narcotics on induction, maintenance, and after-results of anaesthesia. He urged that the anaesthetist should see his patient some time before the operation, and insisted that this precaution was particularly demanded when preliminary narcotics were deemed necessary. He agreed that these narcotic drugs assured a quiet induction in a patient indifferent or asleep, a diminished consumption of the anaesthetic, and absence, or at least great diminution, of all deleterious after-effects. Atropine was very valuable in preventing nasal and oral secretions, but Hewitt had become rather shy of scopolamine except where definite pre-anaesthetic stupor was indicated. He was then inclined, provided there were no contraindications, to use morphine and atropine before operations, but considered that morphine was to be rejected when the patient was subject to respiratory difficulties, and in operations on the mouth, naso-pharynx, and throat in which bleeding was likely to occur unless the anaesthesia was light.

Sir Frederic Hewitt was President of the Section of Anaesthetics of the annual meeting of the British Medical Association in London in 1910. He was a member of the committee of the Medical Insurance Agency (429, Strand), and was much gratified by its success to which he materially contributed.

A memorial service was held in the chapel of St. George's Hospital at 2 p.m. on January 12th. It was attended by numerous past and present members of the hospital staff, and by representatives of many of the other institutions and associations with which Sir Frederic had been connected.

Dr. J. BLUMFELD, Senior Anaesthetist to St. George's Hospital, to whom we are indebted for much information included in this notice, states that Hewitt occupied himself most successfully with the instruction of succeeding generations of students. There was, Dr. Blumfeld writes, no part of his proficient work upon which his desires were more set than this to encourage the creation of a body of enlightened and experienced administrators of anaesthetics. He strove sedulously to inculcate the principle that the anaesthetist must approach every case of anaesthesia in the spirit of scientific clinical medicine, and choose and administer his anaesthetics according to the results of careful observation and estimation of all the factors involved in the physical and mental condition of the patient and the operation he is about to undergo. Not the least of Hewitt's merits was that by these endeavours he may be said to have really created a school of anaesthetists, and to have done very much not only to improve the general standard of anaesthetic administration, but also to heighten the regard in which that branch of practice is held. As an administrator Hewitt's chief merit, apart from this scientific as opposed to an empirical method of procedure, was the great care which he bestowed upon every detail. This enabled him to trace to their true cause and to treat in the most appropriate way various factors which may give rise to trouble during the inhalation of anaesthetic vapours. It was this care, allied with a natural kindness of disposition, that led very largely to Hewitt's wide popularity amongst patients, for any one who had undergone an operation for which he had given the anaesthetic was most likely to request his presence again if the second occasion arose. He became, of course, more widely known still to the public by his appointment as anaesthetist to King Edward VII, to whom he administered anaesthetics when Sir Frederick Treves operated for appendicitis in 1902.

Mr. G. R. TURNER, Surgeon to St. George's Hospital, sends us the following appreciation: Hewitt was most conscientious, thorough, and painstaking. He did more to elevate his particular speciality and to put it on a proper scientific basis than any of his predecessors. When operating on any case of his the surgeon had absolute confidence that no anaesthetic trouble or disaster would occur.

He liked to see his future patient if possible before the operation day, and on several occasions he has discussed this matter with me and urged the necessity of it whenever any grave operation was contemplated. As physician-anaesthetist to St. George's Hospital—the first to be appointed—he gave lectures to the students and supervised the department with extreme care and keenness. If ever a patient in the hospital died under an anaesthetic he was the authority to whom the inquiry was entrusted, and he presented always a very full analysis of the medical aspect of the case to the Medical School Committee. Hewitt was very insistent that no hot-water bottles should ever be in contact with a patient recovering from an anaesthetic; the bed was to be warmed by them before the patient was put in it, but none were ever to be allowed to touch him. He gave me an anaesthetic five or six times when I had a serious illness and operations about nine years ago, and I was never once sick afterwards. For this I am still grateful to him. In all school and hospital matters he did his utmost for St. George's, and was practically the founder of the St. George's Hospital Club; he was largely instrumental in getting the recreation ground for the students at Wimbledon, and was for some considerable time the backbone of the *Hospital Gazette*. In private life he was genial, humorous, and well informed, and his death will be deplored by a large circle of friends.

THOMAS BUSHBY, M.B.EDIN., M.R.C.P.LOND.,

MAJOR R.A.M.C.(T.),

HONORARY PHYSICIAN, LIVERPOOL NORTHERN HOSPITAL.

WE regret to announce the death, at Leamington, on December 31st, 1915, of Dr. Thomas Bushby of Liverpool. He was born at Rainhill, near Liverpool, some fifty-seven years ago, was educated at Marlborough, and studied medicine at the University of Edinburgh, where he graduated M.B., C.M. in 1880. When he entered practice in Liverpool he became private assistant to the late Mr. E. R. Bickersteth, and remained in this position for several years. Mr. Bickersteth's private practice was an education to any young medical man, as it comprised every branch of medicine. Dr. Bushby's first public appointment was that of assistant physician to the Liverpool Hospital for Diseases of the Chest. He was also for many years surgeon to the Liverpool police, and was much esteemed by the members of the force. Dr. Bushby on his resignation was instrumental in securing an increase in the salary of police surgeons in the city, and in this respect earned the gratitude of the medical profession.

In 1897 he received the appointment of honorary physician to the David Lewis Northern Hospital, which is close to the docks, and receives, besides patients from the immediate vicinity, many seaborne cases of illness, including tropical affections. Dr. Bushby held this appointment till the time of his death, although latterly, owing to the state of his health, he was unable to visit the hospital as he would have wished. In addition, Dr. Bushby was a valued friend and physician to some of the Liverpool nursing institutions and philanthropic agencies. In medico-political matters Dr. Bushby did yeoman service. He acted as one of the Liverpool Representatives at the Representative Meetings of the British Medical Association. Dr. Bushby, quiet as he was by nature, revealed himself not only to be public-spirited, but thoroughly alive to the interests of his profession. His reports to the Liverpool Division of the proceedings of Representative Meetings were models, and those who listened to them felt that Dr. Bushby had given the Division a clear and concise account, lit up from time to time with a spark of humour, all the more agreeable because unexpected. He was also president of the Section of Medical Sociology of the annual meeting of the Association in Liverpool in 1912. Whoever dealt with Dr. Bushby, whether patients, practitioners, hospital colleagues, or directors of companies of which he was medical adviser—for example, Liverpool, London, and Globe, the London and North-Western Railway Company—all formed the opinion that he was a man of sound judgement, great kindness of heart, and straightforward in all his actions. About the beginning of the war his health began to fail, and it was a great grief to him that he could not do his share as Major, attached to the 1st Western General Hospital, in attending to the sick and wounded soldiers. He felt himself compelled to resign, although it was anticipated that after a period of rest he would be able to resume his duties.

Dr. Bushby was of a rather shy and retiring disposition, and, to those who did not know him well, distinctly reserved. He was inclined to hide his light under a bushel, and did not always readily reveal his knowledge. He was a student in the true sense, and possessed an extensive knowledge of medical literature and the classics. For many years he acted as the local secretary to the New Sydenham Society, now defunct. Not only was Dr. Bushby a well-equipped physician, but he took great interest in diseases of the skin, and his opinion on an obscure case was generally sought. His wide experience gave him a sort of instinct in diagnosis and treatment of disease. When prevailed upon, he had many amusing anecdotes to relate, and very often these scored a point against himself. Dr. Bushby will be much missed by all with whom he was brought into contact, and not least by his colleagues. He held various posts in succession in the Liverpool Medical Institution, and was a vice-president at the time of his death.

The funeral took place at Leamington, and at the same time a memorial service was held in the David Lewis Northern Hospital Chapel. At this service his former colleagues, many of his professional brethren, and members of the Hospital Governing Board were present. An address was given by the Rev. T. Pemberton, M.A., chaplain of the hospital, who took his text from Revelations, chap. 14, verse 13.

Dr. Bushby was married to Mary Wimble, a niece of a well known and highly respected Liverpool merchant, Sir William Bowring, Bart. He leaves a widow and a grown-up son, at present at Sandhurst, and a daughter. The memory of an unselfish man, upright in all his dealings, and of unswerving rectitude, lives long; such a man was Dr. Thomas Bushby.

DR. W. B. WARRINGTON writes: I was a colleague of Dr. Bushby for twelve years at the Northern Hospital, and should not like his passing away to remain without some small tribute to his memory from me. What impressed me constantly in our long co-operation in hospital work was his great unselfishness in any kind of activity that had to do with the reputation of the hospital or the efficient treatment of patients. One was always certain that his opinions were influenced by a single-minded desire to do the best. He was a courteous and most considerate colleague, and in judgement wise and temperate. We were, perhaps, unusually often associated together in professional work and consulted constantly at the bedside of each other's patients. For many years it was our custom to discuss, together with the students, the nature of the illness of some patient previously unseen by either of us. I think this was a very useful method of teaching; we freely asked each other questions and encouraged the students to do the same. So far as I have the knowledge or capacity to estimate Bushby's professional acquirements, they were very great. Thoroughness in examination and large common sense, illuminated by a most varied experience, were his chief characteristics as a physician. He had many interests in the varied branches of medicine, but I fancy that diseases of the heart and of the skin were rather a hobby with him. He introduced very early into the wards the modern methods of the graphic study of the heart, and was undoubtedly an authority on cardiac pathology. His early death at the maturity of his professional powers is very sad. A grateful and kindly memory will always be associated by his many friends with the name of Thomas Bushby.

GUIDO BACCELLI, M.D.,

SENATOR OF ITALY; PROFESSOR OF CLINICAL MEDICINE, UNIVERSITY OF ROME.

GUIDO BACCELLI, who died suddenly of heart failure on January 10th, was a descendant of a well-known Florentine family, settled in Rome for more than two centuries, and was himself born in Rome on November 25th, 1832. He was thus in his eighty-fourth year. His father, Antonio Baccelli, was a physician of note, and there was a strong medical strain in his ancestry. In 1848 he entered the Ghislieri College at Pavia. He afterwards studied medicine

in the university of his native city, taking his doctor's degree in 1852. In 1855 he obtained by competition the post of assistant physician to the hospitals, and in 1856, again as the result of open competition, he was appointed to the chair of forensic medicine in the University of Rome. He also lectured on botany and on pathology. He resigned his position as professor of forensic medicine after two years on account of political differences with the Papal Government, and devoted himself to the study of morbid anatomy. When a chair of that subject was founded in the university Baccelli was appointed the first professor. In that capacity he had a great influence in turning the minds of his pupils in the direction of modern scientific methods. In 1863 he was appointed lecturer on clinical medicine, and in 1870, when Rome became the capital of Italy, he was appointed professor of clinical medicine, a post which he continued to hold till the end of his life.

His activity as a teacher and as a very busy consulting physician did not exhaust his abounding energy. In 1875 he entered the Italian parliament as one of the Deputies for Rome, and soon took a leading place as a politician. In 1881 he became Minister of Public Instruction, and held that portfolio four times in all, doing great service to his country by the promotion of far-reaching reforms both of primary and university education. To him Rome chiefly owes the Policlinico, a magnificent pile of buildings, fully equipped for the study of disease. He was also once Minister of Agriculture, Industry, and Commerce. He was prominent as a sanitary reformer, and was at one time President of the Board of Health. He took an active part in the sanitary improvement of the Campagna; for his efforts in that direction he received the thanks of the Italian Parliament. He was a Senator of Italy.

Baccelli was president of the Eleventh International Congress of Medicine held in Rome in 1894. Those who attended that meeting will remember his fine presence, his stately oratory, the dignity with which he discharged the duties of his office, and his princely hospitality. He could discourse in Latin of Ciceronian quality, and was no little proud of the accomplishment. In Grant Duff's *Notes from a Diary, 1889–1891*, there is the following passage: "Bunsen had been much struck by a scene at the great Medical Congress held this year (1890) in Berlin. When the representative of the Italian Government was called, up rose Baccelli—some six foot three high, and broad in proportion. In the deepest of voices he began: Vos medicos Latine alloquor, Latine quia Latinus sum!" On that occasion he conveyed the formal invitation to the Congress to hold its next meeting in Rome. The closing words of the invitation were as follows: "Scientiae atque artis humanissimae vexillum consertum in Capitolio, viribus omnigenis fraterno more conjunctis saeculis nationibus immortale fulgebit." These words have a melancholy sound at the present day when the banner of science and humanity, torn to shreds by murderous projectiles, stands bare, a grim reminder of a lost brotherhood.

Besides a monograph on Roman malaria, published in 1878, in which his views on the sanitary improvement of the Campagna were embodied, Baccelli was the author of many contributions to medical literature. The variety of his scientific interests is shown by the following imperfect list of his works: A treatise in four volumes on the pathology of the heart and aorta (1863 to 1867); clinical lectures on malaria (1869); subcontinuous fevers, containing his earliest researches on malaria (1876); true empyema (1868); primary cancer of the spleen (in Latin, 1876); a new method of treatment for aneurysm of the aorta (1876); a new symptom of ovarian tumours in general and of ovarian cysts in particular (1876); the transmission of sounds through endopleuritic effusions (1875 and 1877); and State medicine and clinical medicine in ancient and modern Rome (1879); and the paradoxal compensation of cardiac lesions (1894).

In the House of Commons on January 4th the sudden death of Sir G. SCOTT ROBERTSON on January 2nd was mentioned in connexion with a verbal amendment to the Munitions War Bill which stood in his name. Mr. Lloyd George, in moving the amendment, said that members of all parties would have heard with very great regret of the removal of an honourable and gallant gentleman, who had won great distinction in the public service, and who was highly respected in every quarter of the House.

DR. JOHN MACRURY, well known to naturalists as the author of *The Birds of the Island of Barra* and *Notes on Ornithology* in *A Vertebrate Fauna of the Outer Hebrides*, died suddenly in a nursing home at Glasgow on January 4th. He was a Hebridean, born in Benbecula, and he graduated at Glasgow in 1877. After holding the appointments of house-surgeon and house-physician at the Glasgow Western Infirmary and assistant physician at the Glasgow Dispensary for Skin Diseases, Dr. MacRury began practice in Barra, in the Outer Hebrides, where he worked so hard that his health became impaired, and he took a voyage to New Zealand. On his return he settled in Millport, on the isle of Great Cumbrae, in the Firth of Clyde, where he gained an extensive practice among his fellow townsmen and visitors. He was a good shot, sportsman, and a keen golfer. He leaves a widow, and is survived also by his brother, Colonel Colin William MacRury, I.M.S. Dr. John MacRury will be widely remembered by ornithologists all over the world, as he was an authority on birds and possessed a fine collection of eggs.

THE HON. WILLIAM MACKAY, M.D., died at Reserve Mines, Nova Scotia, on November 8th, 1915, after a long, distinguished, and honourable career in the practice of medicine and in public affairs. He was born at Earltown, Nova Scotia, of Scottish parentage, was educated at Truro, and in 1873 received the degree of M.D. from Bellevue Medical College, New York. In 1886 Dr. MacKay was elected to the Nova Scotia House of Assembly, and was chosen leader of the Opposition. He was defeated in 1890, but re-elected in 1894, and chosen leader of the Liberal-Conservative party. In November, 1912, he was summoned to the Canadian Senate. Dr. MacKay continued to practise until a few days before his death. He was twice elected president of the Medical Society of Nova Scotia, and was one of the originators of the first Public Health Act of that province. His son, Major Daniel S. MacKay, M.D., is with his regiment in France.

Universities and Colleges.

UNIVERSITY OF LONDON.

THE following candidates have been approved at the examination indicated:

FIRST M.B.—D. D. Anderson, Sarah E. Andrews, Marjorie M. S. Bartlett, A. Bearblock, Margarida R. Bensaude, M. Z. Bochenek, Hylda C. Briscoe, J. L. McK. Brown, G. H. A. P. Clavier, S. Cohen, Alison M. Collie, Catherine A. Cowan, Beryl Dyer, Winifred M. Fawssett, Kathleen Field, P. J. Freilich, I. Frost, N. Gallant, Kate Glyn-Jones, I. Goldberg, Eleanor Graham, T. F. Händel, A. J. Harris, S. E. Harvey, F. Heber, R. W. P. Hosford, Doris M. Howard, Margaret G. Jones, H. C. V. Joy, R. Keene, Mary E. Kennedy, W. E. K. Kirby, Doris G. Knowles, C. P. Lake, Gdal-Leizer Levin, L. O. Lindsay, Mary Michael, Marjorie Pierce, C. A. Probert, J. Pronjansky, W. W. Reeve, *E. H. Richards, E. A. Roberts, M. V. Roberts, W. A. M. Smart, A. W. L. Smith, Sonia Straschun, Kathleen A. H. Sykes, A. W. Taylor, H. E. Thomas, R. Thursz, Norah R. Trouton, Madeline H. J. Umpleby, Dorothea C. Wigfield, G. M. Willey.

* Awarded a mark of distinction in Physics.

NATIONAL UNIVERSITY OF IRELAND.

THE National University of Ireland, founded in Dublin by the Irish Universities Act of 1908, gives in its *Calendar* for 1915[1] all the information customarily to be found in the useful but somewhat dry publications of this class. The university has three constituent university colleges—at Dublin, Cork, and Galway; in addition it has a recognized college, St. Patrick's, Maynooth. The book will naturally be indispensable to those for whom it is designed.

UNIVERSITY OF BOMBAY.

THE first volume of the *Calendar*[2] of the University of Bombay contains a mine of information about the regulations, the degrees, the 112 endowment funds, the benefactions, the 22 recognized colleges, and all the other subjects of interest to its present and future members. The second volume consists of many hundreds of examination papers set in 1913-14 for the

[1] Dublin: A. Thom and Co., Ltd. 1915. (Post 8vo, pp. 767.)
[2] Bombay: Government Central Press. 1915. (Post 8vo, pp. 1273 and 482.)

candidates in its 26 various branches of instruction. Invaluable to students in India, these volumes are of interest to the inhabitants of Great Britain as an indication of the thoroughness of the British Raj.

CONJOINT BOARD IN IRELAND.

THE following candidates have been approved at the examinations indicated:

PRELIMINARY EXAMINATION.—I. W. Arnovitch, Lucretia H. H. Byrne, A. B. Clery, W. E. Colahan, R. M. Corbet, J. J. Clune, T. E. Donovan, A. B. Doyle, T. C. Doyle, A. C. Esmonde, M. W. Frazer, Roberta E. Fisher, W. A. Graham, S. G. Gilmore, T. M. Goldon, T. Heffernan, J. Hewitt, Margaret Holliday, P. Killeen, J. J. A. Lord-Flood, T. J. McCormack, A. McLean, H. T. Macaulay, A. Martinson, P. Moylan, R. J. Ogden, P. J. A. O'Connor, T. L. Quinn, J. Rubenstein, G. E. Strahan, J Sheil, R. T. Taylor, Mary E. Tempest, J. W. Tighe, H. E. W. W. Waters

SECOND PROFESSIONAL EXAMINATION.—Miss H. G. Rea (with honours), S. H. Berwitz, J. P. Brennan, J. A. Cunningham, P. J. Filose, S. A. Gailey, Miss E. Gleeson, W. J. McElhinney, P. J. McGing, C. Murray, M. C. Myerson, J. C. Rutherford, R. T. Stoney.

THIRD PROFESSIONAL EXAMINATION.—Miss E. Budd, D. L. Crowe, I. B. Cuthane, F. Daly, E. H. H. Lloyd-Dodd, J. P. Doyle, P. J. Flood, H. Hurst, D. C. Kelleher, J. E. Lucas, T. P. McDonnell, E. T. McElligott, M. F. Murphy, M. M. Price, G. W. Pope, G. C. F. Roe.

SUPPLEMENTAL FINAL EXAMINATION.—J. Cohen, J. Dwyer, T. Farrell, O. J. M. Kerrigan, John F. Saunders Magner, T. J. Ryan, J. J. Walshe, P. W. Walshe.

FINAL EXAMINATION.—M. Burke, L. L. Davys, M. de Caestecker, J. A. Fretton, D. L. Kelly, T. F. Moran, V. A. Power, J. Ryan, C. W. C. Robinson.

SOCIETY OF APOTHECARIES OF LONDON.

THE following candidates have been approved at the examination indicated:

PRIMARY EXAMINATION (PART II).—*Physiology:* R. W. C. Ball, C. C. Bennett, T. G. D. Bonar, H. G. Burford, N. Chena, A. E. Collie, L. Dinerstein, J. H. C. Eglinton, D. C. Farquharson, G. B. D. St. Gray, G. H. C. Harding, R. A. Hickley, G. H. Johnson, E. H. L. Le Clezio, H. O. Long, A. G. A. Miller, C. Moffatt, A. A. Osman, R. H. Parry, A. L. S. Payne, G. F. Peters, R. S. Ralph, A. H. Richards, S. H. Robinson, H. M. Savery, W. M. Savery, A. G. M. Severn, C. G. D. Siggs, W. H. Simmons, W. Skelly, J. Stephen, W. H. Steavenson, E. W. Terry, C. de B. Thompson, R. A. Walker, R. L. Walker, R. W. Warrick, E. R. Webb, S. A. Withers. *Anatomy:* R. W. C. Ball, C. C. Bennett, T. G. D. Bonar, C. V Brown, H. G. Burford, N. Chena, A. E. Collie, L. Dinerstein, J. H. C. Eglinton, F. K. Escritt, D. C Farquharson, G. B. D. St. Gray, G. H. C. Harding, G. H. Johnson, W. A. Jones, E. H. L. Le Clezio, J. S. Lewis, H. O. Long, W. D. McRae, A. G A. Miller, C. Moffatt, A. A. Osman, R. H. Parry, A. L. S. Payne, G. F. Peters, R. S. Ralph, A. H. Richards, S. H. Robinson, H. M. Savery, W. M. Savery, A. G. M. Severn, C. G. D. Siggs, W. H. Simmons, W. Skelly, W. H. Steavenson, E. W. Terry, R. A. Walker, R. L. Walker, R. W. Warrick, E. R. Webb, S. A. Withers.

Medical News.

THE Hon. Charles Rothschild, Sir Walter Lawrence, Bt., and Sir Francis H. Champneys, Bt., have been added to the General Council of King Edward's Hospital Fund for London.

THE Society of German Engineers has offered a prize of 10,000 marks, and other prizes amounting altogether to 5,000 marks, for the best artificial arm.

A MEMORIAL service will be held in the hospital church of St. Bartholomew the Less on Thursday next, at 1 p.m., in memory of former St. Bartholomew men and of students of the hospital who have fallen in the war during 1915.

THE names of Dr. T. H. Parke (Tideswell), Dr. C. A. Thorne (Dore), and Dr. W. H. Turton (Heanor) are among the newly appointed magistrates for Derbyshire.

AS Deputy Gresham Professor of Physic, Dr. Harry Campbell will begin a course of four lectures on dietetics at Gresham College, Basinghall Street, on Tuesday next, at 6 p.m.

THE Lettsomian lectures before the Medical Society of London will be delivered by Major F. W. Mott, M.D., F.R.S., R.A.M.C.T., on February 7th and 21st and March 6th, the subject selected being the effects of high explosives on the central nervous system.

PROFESSOR ARTHUR KEITH will begin a course of lectures on the anatomy of the body for first-aid and ambulance students in the theatre of the Royal College of Surgeons, Lincoln's Inn Fields, at 5.30 p.m., on Monday, February 14th. Further particulars can be obtained on application to the Secretary of the College.

AN advanced course of lectures on infant care for voluntary health workers, teachers, and mothers has been arranged by the National Association for the Prevention of Infant Mortality and the Welfare of Infancy (4, Tavistock Square, W.C.). The lectures will be given at the house of the Royal Society of Medicine (1, Wimpole Street), and the course will begin on January 24th.

IT is stated that the Russians have transferred the University of Warsaw to Rostow on the Don. The German Government has re-established the University of Warsaw and created a new faculty of medicine.

AT a meeting of the executive committee and members of the Society for the State Registration of Nurses on January 8th, a resolution was unanimously adopted condemning the Red Cross scheme for a college of nursing. A meeting of the central committee for the State Registration of Nurses is to be held on Saturday, January 15th, to consider the matter.

THE Emperor of Japan has conferred the Third Order of the Rising Sun on Dr. William H. Welch, of Johns Hopkins University, and the Third Order of the Sacred Treasure on Dr. Simon Flexner, of the Rockefeller Institution, New York, in recognition of help and guidance given to Japanese students of medicine in the United States, and of their contributions to medical work in Japan.

A HERB-GROWING association, affiliated to the Women's Farm and Garden Union, has been formed to give advice on herb growing and preparation, and by co-operation to regulate the growing of different herbs, so that the market may not be overstocked. Information can be obtained from the Secretary of the Herb-growing Association, 45 (6), Queen Anne's Chambers, Westminster, S.W.

THE name of the firm of Studebaker is well known in this country as the maker of motor cars possessing many excellent qualities, which have been gradually evolved during many years of development. From a small book recently issued, it appears that the firm began some sixty years ago as a maker of wagons strong enough to stand the journey over very rough roads or tracks from the Eastern to the Western States. It is now turning out 60,000 motor cars a year in huge factories. The several processes are carried out in six divisions. The book contains a description of the growth of the system of manufacture and of its present methods. It illustrates four cars—two four-cylinder cars, a four-seated touring and a two-seated roadster, and two six-cylinder cars, a four-seated touring car, and a two-seated cabriolet. The price of the four-cylinder touring car is £295, and the four-cylinder roadster £285. Copies of the book can be obtained on application to the company at 117-123, Great Portland Street, London, W.

SOME time ago the director of the appointments bureau of the Harvard Medical School issued a schedule of questions to 900 medical practitioners who had graduated there since 1900. They were invited to state what they had done, the line of practice adopted, and the amount of their professional income. The object was to obtain suggestions that might help to improve the course of education and the conditions for doctors and the communities served by them. Six hundred answers were received. The average earnings of men who had been thirteen years in practice were given as £936, while the professional income of men in their fourth year was £367, and that of men in their first year was a little over £240. Of the whole number who replied, only 36 had confined themselves strictly to general practice; 134 had combined general practice with a speciality, and 142 were pure specialists. The last number included those who had given themselves up to laboratory work. Of the specialists, 90 were surgeons, 9 gynaecologists, and 9 orthopaedists. One conclusion drawn from the returns is that the local distribution of doctors is not satisfactory, too many choosing large cities for their sphere of work.

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